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PART II

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

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TRAWL FISHERY OF THE GULF OF ALASKA

Preliminary Fishery Management Plan

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On the 4th of February, 1977, the Secretary of Commerce, through an appropriate delegation of authority to the Associate Administrator for Marine Resources of the National Oceanic and Atmospheric Administration and the Director of the National Marine Fisheries Service, published a Notice of Determination, Preparation, Issuance, and Implementation of Preliminary Fishery Management Plans at 42 FR 6873. In order that each Plan may have the widest possible circulation, the Secretary has decided that each should be published in the FEDERAL REGISTER.

Dated the 4th day of February, 1977 at Washington, D.C.

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National Marine Fisheries Service.

PRELIMINARY FISHERY MANAGEMENT PLAN FOR TRAWL FISHERY OF THE GULF OF ALASKA

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1.0 INTRODUCTION

Prior to the commencement of fishing by the U.S.S.R. in 1962, the historic fishery for bottomfish in the Gulf of Alaska was almost entirely by U.S. and Canadian fishermen who primarily sought Pacific halibut, Pacific cod, and sablefish. In 1962, the U.S.S.R. entered this fishery with a large distant water fishing fleet. Since 1962 other nations have entered the fishery with a consequent great increase in the size of harvests and scope of operations. The current fishery impacts both directly and indirectly on U.S. fisheries.

This preliminary management plan is for foreign fisheries that take bottomfish, using trawls, within U.S. jurisdiction in the Gulf of Alaska from the Canadian border northwesterly to the eastern Aleutian Islands. It is similar to plans for trawl fisheries in the eastern Bering Sea and the Pacific Northwest and complementary to a specific plan for sablefish.

2.0 DESCRIPTION OF THE FISHERY

A. AREAS AND STOCKS INVOLVED

For purposes here, the Gulf of Alaska is defined to include that portion of the eastern North Pacific Ocean between the eastern end of the Aleutian Island chain (near 170° W) and Hecate Strait (near 54°30′ N) and includes INPFC[1] Statistical Areas Shumagin, Chirikof, Kodiak, Yakutat, and Southeastern (Figure 1). Total area of continental shelf in the Gulf of Alaska is about 100,000 km^2, which is more than the shelf area in the Washington-California region but only about 10 percent of that in the Bering Sea. Between Canada and Cape Spencer in the Gulf of Alaska the continental shelf is narrow and rough. North and west of Cape Spencer it is broader and more suitable for trawling. As it curves westerly fom Cape Spencer toward Kodiak Island it extends some 50 miles seaward, making it the most extensive shelf area south of the Bering Sea. West of Kodiak Island and proceeding along the Alaska Peninsula toward the Aleutian Islands, the shelf gradually becomes narrow and rough again.

Diversity of commercial bottomfish species in the Gulf of Alaska is intermediate between the Bering Sea, where the fewest species occur, and the Washington-California region, where the most species are present. Much of the reduced diversity in the Gulf of Alaska results from a simplification in the community of rockfishes (Scorpaenidae). For example, in the Oregon-Washington region a total of 22 species of rockfishes (genus *Sebastes* and *Sebastolobus*) were encountered in exploratory fishing surveys, but in the Gulf of Alaska only 13 species were identified and only 5 occurred in over trace quantities (Alverson, et al, 1964). The number of species of rockfishes encountered in the Alaska Peninsula region further declined to six. Only one species of rockfish, Pacific ocean perch (*Sebastes alutus*) has been the target of a major fishery in the Gulf of Alaska.

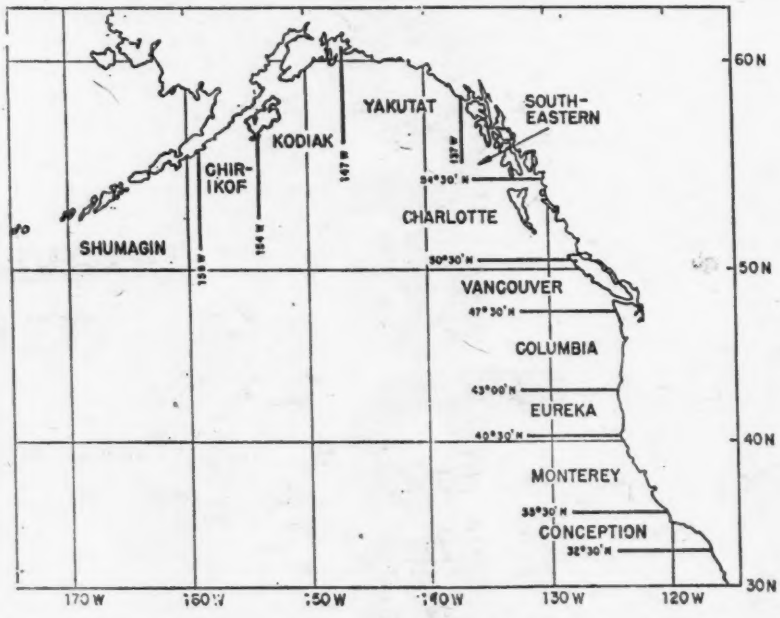

Figure 1.--Area divisions of the Northeast Pacific Region.

The relative abundance of fishes in the cod family (Gadidae) also differs in the Gulf of Alaska compared to the other regions. Pacific hake (*Merluccius productus*), the most abundant of the cod-like fishes off Washington-California, is present only in the southern portion of the Gulf and generally not in commercial quantities. Pollock (*Theragra chalcogramma*), the dominant "cod" and largest element in the bottomfish biomass of the Bering Sea, is much less abundant in the Gulf of Alaska and becomes progressively scarcer to the south until it is practically absent off Oregon. However, the abundance of pollock in the Gulf has increased by perhaps an order of magnitude during the past decade or so coincident with a reduction in the abundance of Pacific ocean perch and sablefish (*Anoplopoma fimbria*). Pollock now appear to comprise the largest exploitable biomass within the gadoid community in the Gulf, approaching perhaps that of Pacific hake in the Washington-California region but far smaller than that of pollock in the Bering Sea. Pacific cod (*Gadus macrocephalus*) may reach its greatest level of abundance in the Gulf.

Other abundant roundfishes which have been the target of fisheries in the Gulf include sablefish (*Anoplopoma fimbria*) and the so-called Atka mackerel, a member of the greenling family (Hexagrammidae). The sablefish attains its greatest abundance in the Gulf of Alaska. Little is known about the distribution and abundance of Atka mackerel because it has only recently become the target of foreign fisheries and was generally unavailable to the gear used in past U.S. surveys.

Many of the flatfishes present in the Gulf of Alaska also occur in the Bering Sea and Washington-California region; however, the relative abundance of the different species varies greatly between areas. In the Bering Sea yellowfin sole (*Limanda aspera*) dominates the flatfish community, but is comparatively scarce in the Gulf and absent off Washington-California. Petrale sole (*Eopsetta jordani*) and English sole (*Paraphrys vetalus*) are important segments of the flatfish community off Washington-California but they are scarce in the Gulf and for all practical purposes absent in the Bering Sea. The arrowtooth flounder, or so-called turbot (*Atheresthes stomias*), is widely distributed along the Pacific and Bering Sea coasts of the United States and appears to comprise the largest part of the exploitable biomass of flatfishes in the Gulf of Alaska. Other abundant flatfishes in the Gulf include Pacific halibut (*Hippoglossus stenolepis*), which reaches its greatest abundance there and off British Columbia; starry flounder (*Platichthys stellatus*); flathead sole (*Hippoglossoides*); rex sole (*Glyptecephalus zachirus*); and, in deep water, the Dover sole (*Microstomus pacificus*).

Elasmobranchs are represented in the Gulf by several species of sharks and skates. The spiny dogfish shark (*Squalus acanthias*) is much less abundant in the Gulf than in waters off British Columbia and the Pacific Northwest where it is an important element within the bottomfish community. Skates (*Rajidae*) are widely distributed throughout the Gulf where they are most abundant on the inner shelf. Ratfish (*Hydrolagus collei*) are present in the Gulf but are much less abundant there than in waters to the south. The abundance of all elasmobranchs appears to decrease progressing from east to west in the Gulf of toward the Alaska Peninsula.

Although the evidence is incomplete, most bottomfish in the Gulf of Alaska can be viewed as being permanent residents there. Some Pacific halibut have been observed to migrate large distances along the coasts of the United States and Canada and to and from waters off Siberia; yet, for management purposes a line is drawn at Cape Spencer by the International Pacific Halibut Commission to differentiate a northern or western stock (Area 3) from a southern or eastern stock (Area 2). Some sablefish also have been observed participating in long migrations, but they form entities within the Gulf of Alaska which probably should be managed as separate units (see Preliminary Management Plan for Sablefish).

Seasonal movements of bottomfish within the Gulf of Alaska resemble more closely those off Washington-California than those in the Bering Sea where more pronounced changes in temperature and other oceanographic conditions exert a greater effect. Alongshore or coastwise movements of most bottomfish in the Gulf are probably of short range. Known exceptions are those previously mentioned for Pacific halibut and sablefish and possibly for Pacific ocean perch. Lyvbimova (1963, 1965) postulated that Pacific ocean perch migrate in the winter from the Unimak-Chirikof region of the western Gulf into the Kodiak-Yakutat part of the northern Gulf. This winter movement is reported to be a migration for spawning which reaches a peak in May. A return migration for feeding supposedly occurs after spawning with the maximum density of the "fattening" Pacific ocean perch population occurring south of Unimak in August–September. However, U.S. investigators have not verified the existence of this migratory pattern which was proposed by Soviet investigators.

Seasonal bathymetric movements of bottomfish within the Gulf of Alaska often are extensive from the standpoint of the range of depths covered but are usually rather limited in terms of distance travelled. This again more closely resembles the situation off Washington-California than in the Bering Sea where a bathymetric migration over a given depth range typically involves a greater distance of travel because of the much wider and gently sloping shelf present there. Bathymetric movements generally are of small vertical amplitude for such species as Pacific cod which are endemic to the continental shelf and of large vertical amplitude for such species as sablefish, which are indigenous to the slope. In both situations the movement is onshore from deep to shallow water in summer for feeding and offshore in winter for spawning.

B. HISTORY OF EXPLOITATION

The oldest fisheries in the Gulf of Alaska are those by the native peoples who caught Pacific halibut, cod, herring, and other species for subsistence. Catches were traded or sold to the Russians and later to the Americans after the purchase of Alaska by the U.S. in 1867. Bottomfish and herring are still important sources of food to many groups of Alaskan natives but these subsistence harvests are now dwarfed by commercial operations.

The earliest commercial venture for bottomfish by white Americans in Alaska was for Pacific cod. This fishery was an outgrowth of the discovery of cod in the Sea of Okhotsk in 1857 by the U.S. brig *Timandra* (Cobb, 1927). The earliest U.S. cod venture to Alaska was in the Bering Sea in 1864. The famous Shumagin Island cod grounds were discovered in 1867. The cod fishery was carried out from ports in Washington and California as well as from shore stations in Alaska. Landings of cod by U.S. vessels were largest during World War I when almost 4 million fish were taken annually. Demand for cod declined in subsequent years and the U.S. line fishery which had dropped to a low level by the early 1930's was discontinued by the mid-1950's (Alverson et al, 1964). Records are not available on the amount of cod caught in the Gulf of Alaska, except for intermittent periods during the fishery, but it appears that the catches in the Gulf of Alaska comprised less than one-half of the total, with most being taken from the Bering Sea and Aleutian Islands area.

The next commercial fishery by the U.S. in the Gulf of Alaska was for herring in the late 1800's for meal and oil. The first reduction plant was built in 1882 in southeastern Alaska; salting, pickling, preparation of whole fish for bait, and processing of roe came later (Reid, 1972). Largest landings of herring were made in Alaska in 1937 when over 100,000 metric tons were caught, mainly for processing into meal and oil. The average landing of herring in Alaska in 1970–1974 was 10,540 metric tons.

Although commercial fishing for Pacific halibut began in certain inside waters of southeastern Alaska as early as 1895, it was considerably later before the major offshore banks were brought into production (Thompson and Freeman, 1930). The deep-sea fishery for halibut commenced about 1910 when vessels began to frequent more distant waters in search of larger catches. By 1916 some prospecting had been done as far west as the Shumagin Islands. However, it was not until 1923 that exploitation of the Gulf of Alaska grounds began in earnest. The fishery for Pacific halibut throughout its range is a joint undertaking by U.S. and Canadian fishermen who enjoy reciprocal landing privileges. During the period 1963–1975 an annual average of approximately 22,000 metric tons of Pacific halibut were harvested from Gulf of Alaska waters by the com-

bined U.S.-Canadian longline fleet, with U.S. and Canadian vessels accounting for 58 and 42 percent of the total, respectively.

The next U.S. fishery for bottomfish to develop in the Gulf of Alaska was for sablefish. A setline fishery for sablefish began on a limited basis in the late 1800's off Washington and British Columbia, thence expanded to California, Oregon, and Alaska, and attained major importance about 1913. Production in Alaska was largest during the years 1942–1946 when an annual average of about 3,600 metric tons, or almost one-half of the U.S. total, was landed. Recent landings in Alaska have been smaller than at any time since World War II, averaging only 740 metric tons annually during the years 1970–1974, which was approximately 16 percent of the U.S. total. Most of the sablefish landed by U.S. vessels in Alaska have been caught in inside or offshore waters of southeastern Alaska.

Although Canadian vessels have fished for a few species of bottomfish off Alaska, the extent of such fishing has been even smaller than that by U.S. vessels. Most of the Canadian fishing effort off Alaska has been for Pacific halibut. Canadian vessels participated to a very limited extent in the former line fishery for Pacific cod in the North Pacific. It is not clear whether such participation occurred prior to 1900 during the early period of the cod fishery, but it is known that one or two Canadian operations for cod were carried out off Alaska about 1903 and 1913 (Forrester et al, in press). Information on the extent and area of origin of these Canadian catches of cod is not available so it cannot be determined whether they were caught in the Gulf of Alaska or Bering Sea. Sablefish has been the most important of the other species of bottomfish harvested by Canadians in the Gulf of Alaska—with lesser amounts of Pacific cod, lingcod (*Ophiodon elongatus*), and rockfish also being caught in some years. The annual average Canadian harvest of bottomfish from the Gulf of Alaska during the period 1963–1975 was reported as being 9,340 metric tons of halibut and 118 tons of other bottomfishes. The Canadian harvest of halibut from the Gulf was 42 percent of the combined U.S.-Canadian catch in those years and was taken from waters throughout the Gulf. Canadian catches of sablefish, Pacific cod, lingcod, and rockfish were entirely from INPFC Area Southeastern.

The earliest reported fishing by Japanese vessels off Alaska resulted from an order issued by the Secretary of Commerce in April 1918 and terminated in July 1921, which suspended the law forbidding the landing of catches by foreign vessels in U.S. ports. The suspension was to encourage the importation of fish in order to compensate for reduced food supplies caused by World War I. During the time the suspension was in effect, Japanese vessels landed 4½ million dry-salted cod and 176,000 pounds of stockfish at San Francisco and Puget Sound ports (Cobb, 1927). Although most of this cod was from around the Kurile Islands and Okhotsk Sea, in a few instances the Japanese vessels caught their fish off Alaska. Neither the amount or area of origin (Bering Sea or Gulf of Alaska) of catches off Alaska can be determined now.

The first significant effort by Japan in the Gulf of Alaska was in 1960 when several small trawlers were diverted there from the Bering Sea to carry out exploratory operations. Exploratory probes continued in the Gulf through 1962, and commercial operations by Japan commenced with the assignment of several large independent trawlers there in 1963 (Chitwood, 1969). To some degree the initiation by Japan of a full-scale fishery for bottomfish in the Gulf of Alaska in 1963 was precipitated by the start of a fishery there by the U.S.S.R. in 1962. Japan had shown prior constraint in promoting a fishery in the Gulf of Alaska, at least partly in consideration for the potential impact on halibut—a subject of discussions between the governments of the U.S., Canada, and Japan. The fleet of Japanese trawlers and area of operation in the Gulf was expanded rapidly after 1963 with a resultant increase in catch from about 10,000 metric tons in 1963 to over 80,000 tons in 1966.

Although fishing for sablefish in the Gulf of Alaska by the Japanese longline-gillnet fleet began as early as 1963, the catches were not officially reported by Japan until beginning in 1968. This apparently was because of confusion in Japan's licensing system, which resulted in the catches either going unreported or being reported in such a way that they were erroneously attributed to other areas. According to estimates by NMFS law enforcement personnel, the annual average catch of sablefish by Japanese longline-gillnet vessels in the Gulf during the years 1964–1967 was about 2,700 metric tons. During the subsequent period, 1968–1974, the annual average catch of sablefish by this fleet was 18,788 metric tons. The annual average longline catch of sablefish by Japan in INPFC Area Southeastern during 1968–1974 was 6,843 metric tons, or a little more than one-third of Japan's total longline catch from the Gulf. The relatively large catches taken off southeastern Alaska are particularly significant since that is the primary site for the U.S. sablefish fishery.

Soviet fishing vessels first appeared off Alaska in the eastern Bering Sea in 1959 and expanded their area of operations into the Gulf of Alaska in 1962. In contrast to Japan's fishery which has employed a variety of gear, including trawls, Danish seines, gillnets, and longlines, all fishing by the U.S.S.R. in the Gulf of Alaska has been with trawls. The Soviet fishery in the Gulf has been a classic example of pulse fishing in which massive fishing effort is generated on local stocks with an early buildup in catches, followed by declining yields and catches as abundance quickly falls off, and a shift of effort to other species or grounds to compensate for reduced profitability. This pattern of fishing was followed by the U.S.S.R. on Pacific ocean perch throughout its range in the Gulf, starting in the west around the Shumagin Islands and ending in the east off southeastern Alaska. The Soviet fishery peaked early in the Gulf with total catches reaching an estimated level of over 200,000 metric tons in 1964 and over 300,000 tons in 1965, then falling to 83,000 tons in 1966 and to an all-time low of 9,000 tons in 1970. There has been some recovery in Soviet catches since 1970 to about 80,000 tons in 1974. This was accomplished, however, only by diverting the fleets from Pacific ocean perch, the target of the earlier fishery, to other less heavily exploited species of bottomfish—such as pollock, Atka mackerel, and flounders.

Republic of Korea (South Korea) vessels began fishing for bottomfish in the eastern Bering Sea in 1967 but did not seek bottomfish in the Gulf of Alaska until 1972. The operation in the Bering Sea has involved trawling for pollock and flounders while that in the Gulf has been a long-line and pot fishery for sablefish. South Korea has not provided the U.S. with statistics on the catches taken by its fleets, but estimates have been made by NMFS law enforcement personnel. The estimated catches of sablefish by South Korea in the Gulf of Alaska are 1300 metric tons in 1972, 1700 tons in 1973, 1600 tons in 1974, and 4000 tons in 1975. South Korea has announced a catch target of 18,000 tons of sablefish in 1976, of which perhaps one-half is planned to be taken from the Gulf of Alaska and the other half from the Washington-California area.

Polish vessels carried out exploratory fishing probes into the Gulf of Alaska in 1973, 1974, and 1975. The reported catches were less than 100 metric tons in 1973 and 1974 and about 2,000 tons in 1975; the catches were mostly pollock, Atka mackerel, and rockfish.

One Taiwanese longliner fished briefly in the Gulf of Alaska in 1975 and, as of July 1, 1976, a total of three Taiwanese longliners and one factory stern trawler had been observed in the Gulf.

Catches by each nation participating in the Gulf of Alaska fishery for bottomfish are shown in Table 1. Included but not separately identified are very small amounts of herring taken in some years by Japan and the U.S.S.R. as a by-catch to their fisheries for bottomfish. Not included are catches of herring by the United States which are all taken from in-shore or coastal waters. The period 1963–1974 shown in the Table covers the modern period of the international fishery except for the first fishing in the Gulf of Alaska by the U.S.S.R. in 1962. The all-nation harvest of bottomfish during this 13-year period was 2.5 million metric tons, or an annual average of just under 200,000 tons. The U.S.S.R. accounted for the largest part of the total (49.3 percent)—followed by Japan (37.1 percent), the U.S. (7.6 percent), Canada (5.4 percent), South Korea (0.6 percent), and Poland (trace amount).

Table 1.--Catches of bottomfish in metric tons by all nations from INPFC areas within the Gulf of Alaska, 1963-1974. Amounts shown for South Korea are estimates by NMFS law enforcement personnel. The U.S.S.R. did not provide statistics on catches by INPFC area until 1973.

	United States	Canada	U.S.S.R.	Japan 1/	South Korea	Poland	Total
1963							
Shumagin	1,100	1,250	?	4,401	--	--	?
Chirikof	2,475	3,958	?	1,914	--	--	?
Kodiak	6,517	3,793	?	4,182	--	--	?
Yakutat	1,397	1,752	?	236	--	--	?
Southeastern	6,106	864	?	--	--	--	?
Total	17,595	11,617	108,000	10,733	--	--	147,945
1964							
Shumagin	1,152	1,715	?	1,885	--	--	?
Chirikof	2,094	4,287	?	1,470	--	--	?
Kodiak	5,545	4,827	?	14,053	--	--	?
Yakutat	1,459	1,777	?	22	--	--	?
Southeastern	5,151	937	?	--	--	--	?
Total	15,401	13,543	230,000	17,430	--	--	276,374
1965							
Shumagin	841	1,506	?	12,511	--	--	?
Chirikof	2,690	3,776	?	14,284	--	--	?
Kodiak	5,697	4,271	?	26,390	--	--	?
Yakutat	1,354	2,542	?	62	--	--	?
Southeastern	7,064	1,528	?	--	--	--	?
Total	17,646	13,623	340,000	53,247	--	--	424,516
1966							
Shumagin	488	1,358	?	22,830	--	--	?
Chirikof	1,767	3,457	?	26,667	--	--	?
Kodiak	6,798	4,280	?	34,028	--	--	?
Yakutat	1,653	2,812	?	586	--	--	?
Southeastern	7,158	1,544	?	764	--	--	?
Total	17,864	13,451	83,000	84,875	--	--	199,190
1967							
Shumagin	302	992	?	12,059	--	--	?
Chirikof	2,813	3,998	?	9,398	--	--	?
Kodiak	6,486	2,465	?	23,042	--	--	?
Yakutat	1,563	1,345	?	17,183	--	--	?
Southeastern	6,109	793	?	12,251	--	--	?
Total	17,273	9,593	76,000	73,943	--	--	176,809
1968							
Shumagin	425	1,782	?	12,059	--	--	?
Chirikof	2,281	3,998	?	9,398	--	--	?
Kodiak	4,196	2,465	?	23,042	--	--	?
Yakutat	787	1,345	?	17,183	--	--	?
Southeastern	2,994	793	?	12,261	--	--	?
Total	10,683	11,942	60,000	84,177	--	--	176,809
1969							
Shumagin	545	1,893	?	14,740	?	--	?
Chirikof	1,740	4,566	?	8,731	?	--	?
Kodiak	5,393	2,519	?	18,469	?	--	?
Yakutat	1,366	2,836	?	29,338	?	--	?
Southeastern	5,273	808	?	25,842	?	--	?
Total	14,317	12,622	20,000	97,120	Trace	--	144,059
1970							
Shumagin	796	1,303	?	8,357	--	--	?
Chirikof	2,068	4,224	?	9,115	--	--	?
Kodiak	6,214	2,464	?	19,839	--	--	?
Yakutat	1,027	2,304	?	20,797	--	--	?
Southeastern	5,307	887	?	27,110	--	--	?
Total	15,412	11,182	9,000	85,218	--	--	120,812
1971							
Shumagin	672	1,100	?	9,860	--	--	?
Chirikof	1,577	3,440	?	7,693	--	--	?
Kodiak	5,445	2,548	?	22,899	--	--	?
Yakutat	1,015	1,706	?	23,487	--	--	?
Southeastern	3,665	611	?	23,617	--	--	?
Total	12,374	9,405	31,000	87,556	--	--	140,335
1972							
Shumagin	729	578	?	15,785	?	--	?
Chirikof	1,424	3,023	?	7,350	?	--	?
Kodiak	5,344	2,006	?	26,340	?	--	?
Yakutat	1,003	1,479	?	29,807	?	--	?
Southeastern	4,380	510	?	32,946	?	--	?
Total	12,880	7,596	68,875	112,228	4,000	--	205,579
1973							
Shumagin	523	164	13,983	10,197	?	--	?
Chirikof	957	1,359	16,118	15,174	?	--	?
Kodiak	4,463	1,523	28,214 2/	24,715	?	Trace	?
Yakutat	1,015	1,126	3,844	35,122	?	--	?
Southeastern	3,909	594	--	28,539	?	--	?
Total	10,867	4,766	62,159	113,747	4,000	Trace	195,539

	United States	Canada	U.S.S.R.	Japan[1]	South Korea	Poland	Total
1974							
Shumagin	149	47	20,692	11,524	?	--	?
Chirikof	406	230	7,989	14,842	?	--	?
Kodiak	2,266	209	47,496	31,036	?	Trace	?
Yakutat	760	479	3,471	18,790	?	--	?
Southeastern	3,279	452	--	18,701	?	--	?
Total	6,860	1,417	79,648	94,893	6,000	Trace	188,818

[1] Observations by NMFS law enforcement personnel indicate that Japanese longliners caught approximately 11,000 metric tons of sablefish in 1964-1967 which is not included in the amounts reported by Japan and shown here for those years.

[2] Observations by NMFS law enforcement personnel indicate that the actual catch was perhaps 25,000 metric tons more than the amount shown here as reported by the U.S.S.R.

C. CONTEMPORARY FISHERIES

(1) *United States and Canada.* The contemporary United States and Canadian fisheries for bottomfish differ from those of the U.S.S.R. and Japan not only from the standpoint of the much smaller harvests taken, but also in the basic character of the fishing operations. The United States and Canadian fisheries are mostly directed towards Pacific halibut and are carried out by small long-line vessels. Lesser amounts of sablefish. Pacific cod, lingcod, and rockfish are harvested by several kinds of small U.S. and Canadian vessels. All of the bottomfish caught by U.S. and Canadian vessels are delivered to ports in Alaska, Washington, and British Columbia for processing ashore. In contrast, the distant-water fisheries of the other nations are by much larger vessels which target on a greater variety of species and process the catches at sea. All of the bottomfish caught by the U.S.S.R., Japan, South Korea, and Poland are delivered to the homeland or to other ports outside the United States. The foreign, distant-water fleets typically include a variety of support vessels, including refrigerator transports, oil tankers, personnel transports, patrol vessels, and research vessels. The fleets are self-supporting and obtain most of their supplies and services from the homeland.

(2) *Japan.* From the standpoint of size of catch as well as kind of fishing operations, Japan's fishery for bottomfish is much less extensive in the Gulf of Alaska than in the Bering Sea. During the period 1970–1974, Japan's harvest of bottomfish from the Gulf of Alaska averaged only 99,000 metric tons compared to 1,706,000 tons from the Bering Sea. The Bering Sea harvest is taken by four kinds of fishing operations: a Mothership Fishery, North Pacific Trawl Fishery, Landbased Dragnet Fishery, and North Pacific Longline-Gillnet Fishery (see Preliminary Management Plan for Bering Sea Trawl Fisheries). In the Gulf of Alaska Japan has only two kinds of fishing operations, a North Pacific Trawl Fishery and North Pacific Longline-Gillnet Fishery.

The North Pacific Trawl Fishery is now entirely carried out by factory stern trawlers operating independently of motherships and either offloading their processed catches to refrigerator transports or delivering the catches to Japan themselves. This is in contrast to the earliest period of the fishery when some side trawlers were employed as well as vessels which served as motherships to receive and process the catches. Since 1967 Japan has limited by license to 42 the number of vessels that can participate at any one time in the North Pacific Trawl Fishery; they may fish in waters north of 10° N latitude and east of 170° E longitude. This fishing area includes the Bering Sea, Aleutian Islands, Gulf of Alaska, and waters to the south off Canada and the remainder of the U.S. However, most of the catch by the North Pacific Trawl Fishery is from the Bering Sea. For example, in 1970–1974 the average annual catch by this fishery was 484,000 metric tons from the Bering Sea and Aleutian Island region compared to 77,000 tons from the Gulf of Alaska. The main target in the Gulf of Alaska has been Pacific ocean perch, since the fishery began in 1963, but an increasing part of the catches in recent years has been comprised of other species, particularly pollock and flatfishes.

Whereas most of the bottomfish caught by Japan's North Pacific Trawl Fishery is from the Bering Sea, the reverse situation prevails for the Longline-Gillnet Fishery whose catch is mostly from the Gulf of Alaska. Vessels employed in the North Pacific Longline-Gillnet Fishery in the Gulf of Alaska now use longlines, and sometimes pots, to catch sablefish. In 1963 bottom gillnets were used to catch sablefish but this method of fishing was soon discontinued.

A significant feature of Japan's operations in the Gulf of Alaska has been the increase in fishing efficiency that has occurred over the years. Some of the increase has occurred as a natural consequence of the fishermen learning more about the distribution and abundance of the fish and thereby being better able to anticipate where and when to find them in fishable concentrations. There also has been a major upgrading in efficiency of the fishing fleet. This upgrading has been in terms of vessel size, power of propulsion engines, and efficiency of fishing gear, navigation equipment, and fish-finding devices. Between 1967 and 1975 the average size of factory trawlers employed in the North Pacific Trawl Fishery increased from about 1,500 gross tons to over 2,500 tons. During the same period the average size of vessels in the North Pacific Longline-Gillnet Fishery increased from about 350 gross tons to almost 500 tons. The result of this upgrading has been a marked increase in the fishing power of the fleet which is not apparent when one considers just the number of vessels employed.

(3) *U.S.S.R.* The relative importance of Soviet fishery for bottomfish in the Gulf of Alaska compared to its fisheries in the Bering Sea and Washington-California area has diminished greatly with time. During the initial fishing period in 1962–1965 when Pacific ocean perch was still present in large concentrations, the catch from the Gulf of Alaska comprised 60 percent of the total Soviet harvest of bottomfish (excluding herring) from all Pacific waters off the U.S. and Canada. The comparable figure for the Gulf of Alaska during the period 1970–1974 was less than 9 percent of the bottomfish total. This great reduction in the relative importance of the Gulf of Alaska to the U.S.S.R. has occurred despite efforts by the Soviets to maintain their catches by diverting to other target species besides Pacific ocean perch. In the last few years the Soviets have developed new fisheries in the Gulf for Atka mackerel, pollock, and flatfishes; yet, the recent harvests have been just a small fraction of those taken in 1962–1965.

The U.S.S.R., more than any other nation, has utilized the expeditionary or flotilla concept in its fishing operations off the Pacific and Bering Sea coasts of the U.S. This involves the deployment of several kinds of vessels in support of its catcher fleet. In the Gulf of Alaska these support vessels have included factoryships for receiving and processing catches; refrigerator transports to replenish stores aboard the catcher vessels and to receive, freeze, and transport their catches to the homeland; oil tankers; tugs; patrol vessels; and research vessels. Refrigerator transports are the mainstay of the support operations and some are upwards of 200 meters in length and 25,000 gross tons or more. A large refrigerator transport of 25,000 gross tons has a hold capacity to store about 12,000 tons of frozen products, which is equivalent to the capacity loads of about 13 of the factory stern trawlers now in use—or 6 to 8 of the new supertrawlers recently ordered into production.

Side trawlers and factory stern trawlers are the two kinds of catcher vessels which have been employed by the U.S.S.R. (Hitz, 1968). Side trawlers shoot and haul their nets over the side of the vessel and are smaller and less versatile than the factory trawlers which deploy their nets over the stern. Three classes of side trawlers have been used. Small-

est and oldest of the side trawlers is the SRT class of 265–355 gross tons and a crew of 22 to 26. Next largest of the side trawlers is the SRTR class of refrigerated medium trawlers of 505–630 gross tons and a crew of 26–28. Largest of the refrigerated side trawlers is the SRTM class of around 700 gross tons with a crew of about 30. Side trawlers, particularly SRTM's, often operate independently by processing and freezing their own catches; however, they also may offload their catches to factoryships for processing. In recent years the Soviets have used an increasing number of side trawlers which have been converted to stern ramp trawlers. These converted vessels, known as SRTK's, reportedly have the same hull and machinery below deck as SRTM's but above deck are redesigned for more efficient trawling over the stern.

Factory stern trawlers are the largest of the catcher vessels used by the Soviets. They typically process and freeze their own catches. Because of their larger size and more efficient layout for handling the net over the stern, factory trawlers are capable of fishing under worse weather conditions than side trawlers. The most common factory stern trawler in use off the Pacific and Bering Sea coasts of the U.S. has been the so-called BMRT of 3,170 gross tons and a crew of about 90. In recent years a new class of factory stern trawler, the RTM, has come into use. It is of the same general size as a BMRT but has the advantage of a larger deck area aft for handling gear and fish. Several new classes of "supertrawlers" have been scheduled for serial production by the U.S.S.R. They will be from 4,000 to 5,500 gross tons, up to 7,000 horsepower, and will double the daily fish production and freezing capacity of the factory stern trawlers now in use.

A characteristic feature of the Soviet fishery is a greater reliance on support vessels than by Japan. This appears to be mainly because the catches are not processed to as great an extent aboard Soviet vessels as on Japanese vessels. The more highly processed Japanese products occupy less space aboard the catcher vessels, which means they do not have to unload as frequently as Soviet vessels; hence, there is less need for refrigerator transports.

The same kinds of increases in fishing efficiency that were noted for Japan also have occurred in the Soviet fishery. It is impossible to quantitatively assess the improvement in efficiency—which has resulted from an increased knowledge of the fish and fishing grounds or improvements in fishing gear and navigation and fish-finding equipment. However, it is possible to examine changes that have occurred within the fleet regarding the numbers and gross tonnages of the different kinds of catcher vessels employed. This has been done in Table 2 for all waters off Alaska but it is generally representative of what has occurred in the Gulf of Alaska. A great increase in Soviet fishing power off Alaska is shown by the shift within the side trawler class from the use of small SRT's to large SRTM's and the increasing deployment of large factory stern trawlers. Factory stern trawlers now comprise over one-third of the Soviet catcher fleet off Alaska compared to only about 9 percent of the fleet in 1963–1965. The gross tonnages for the combined classes of vessels are better measures of the fishing power than just the number of vessels. As can be seen from Table 2, the gross tonnage, and hence relative fishing power, of the Soviet fleet increased from an average level of 160,000 gross tons in 1963–1965 to an average level of 514,000 gross tons in 1972–1974.

Table 2.--Number and equivalent gross registered tonnage of different Soviet catcher vessels sighted off Alaska, 1963-1974. Sightings were by NMFS personnel and do not include repeated sightings of the same vessels. Observations not extensive enough to provide comparative numbers in 1959-1962 and unavailable for 1975.

Year	Side trawlers					Factory stern trawlers			Equivalent gross tons, all classes
	SRT	SRTR	SRTM	SRTK	Total	BMRT	RTM	Total	
1963	155	7	--	--	162	10	1	11	79,000
1964	237	9	12	--	258	28	1	29	167,000
1965	330	11	25	--	366	36	3	39	233,000
1966	248	9	44	--	301	42	4	46	245,000
1967	191	7	66	--	264	53	4	57	279,000
1968	97	5	90	--	192	71	3	74	324,000
1969	66	9	127	--	202	79	6	85	377,000
1970	65	11	144	--	220	97	6	103	447,000
1971	92	7	102	2	203	102	5	107	438,000
1972	111	6	161	7	285	100	11	111	497,000
1973	25	7	155	9	196	105	15	120	498,000
1974	25	7	174	8	214	117	14	131	546,000

(4) *Other nations.* South Korean vessels first began fishing for bottomfish in the Gulf of Alaska in 1972, some 5 years after they started in the Bering Sea. Whereas the fishery in the Bering Sea is largely trawling for pollock and flatfishes, fishing in the Gulf of Alaska has been with longlines and pots for sablefish. Longline and pot catches by South Korea in the Gulf of Alaska were less than 2,000 metric tons in each of the years 1972–1974 but increased to an estimated 4,000 tons in 1975 and may double again to perhaps 8,000 tons in 1976. The predicted doubling of catch in 1976 would be in keeping with South Korea's announced target catch in 1976 of 18,000 metric tons of sablefish which will be harvested from waters off Washington-California and the Gulf of Alaska.

Polish vessels began fishing in the Gulf of Alaska in 1973 and, through 1975, had harvested a little over 2,000 metric tons of bottomfish—mostly Pacific cod. Poland uses only factory stern trawlers for catcher vessels and its fishing operation is closely patterned after that of the U.S.S.R. Polish shipyards are among the major suppliers of vessels for the worldwide Soviet fishing fleet; the technology so gained has been put to good use by Poland in developing its own distant-water fisheries off the U.S. and in other parts of the world.

A Taiwanese longliner began fishing in the Gulf in 1975 and was soon apprehended for violating the U.S. contiguous fishing zone. As of July 1976, three Taiwanese longliners and one factory stern trawler had been observed fishing in the Gulf.

D. IMPACTS OF THE FOREIGN FISHERIES ON THAT OF THE UNITED STATES

The kinds of impacts on U.S. fisheries in the Gulf of Alaska have been similar from the distant-water fleets of all nations. Impacts have included the interference with or destruction of longline and pot gear employed by U.S. halibut, sablefish, and crab fishermen; preemption of fishing grounds; and the reduction in abundance of species of current or potential interest to U.S. fishermen.

The impact on stocks of fish and shellfish currently being utilized by U.S. fishermen mostly has occurred in relation to Pacific halibut, sablefish, and crabs. Regarding halibut, Japan abstains from a fishery under terms of the North Pacific

Fisheries Convention; the U.S.S.R. is under no such restriction but declares its vessels do not target on halibut; and in bilateral agreements signed with the U.S. both South Korea and Poland have agreed not to fish for halibut. Despite these restrictions, the foreign trawl fisheries have had an impact as a result of by-catches of halibut taken incidental to fishing for other species. In the northeastern Pacific (Gulf of Alaska and south to California), the by-catch of halibut by trawlers is estimated by the staff of the International Pacific Halibut Commission to have been about 1,500,000 fish (9,000 metric tons) in 1965. Since the late 1960's the annual incidental catch has averaged about 1,000 metric tons in Area 2 and 3,000 metric tons in Area 3. During the peak years, most of the catch was by Soviet trawlers when they were carrying out a very large fishery for Pacific ocean perch in the Gulf of Alaska. These estimates allow for the fact that almost all of the halibut caught by foreign trawlers do not survive even if care is taken to return them quickly to the water. They do not allow for the possibility that foreign trawlers occasionally target on halibut. Regarding the foreign longline-pot fisheries, Japanese vessels are prohibited by their government from operating in waters of a depth less than 500 meters, whereas South Korean vessels are under no restriction as to depth of fishing. The opportunity for South Korean vessels to catch halibut, therefore, is greater than for Japanese longliners. Area-time closures in recent bilateral agreements have been of considerable value in reducing losses of U.S. halibut gear to foreign fleets as well as in reducing incidental catches of halibut by the foreign trawlers.

The impact of the foreign trawl fisheries on U.S. fisheries for crab has been alleviated by incorporating area-time closures into bilateral agreements to keep the foreign fleets away from grounds where crabs and U.S. pot gear are concentrated. Some mortalities of crab still occur from incidental catches in foreign trawls in the areas open to trawling.

Among the major concerns voiced by U.S. fishermen has been the possibility that foreign trawlers catch many salmon of U.S. origin. It is known from U.S. observers aboard Japanese and Soviet vessels, records of fishing by U.S. trawlers, and cruises by NOAA research vessels that salmon are taken in trawls. The incidence of salmon in trawls can vary greatly from season to season, from fishing ground to fishing ground, and depending upon whether efforts are made to catch or avoid salmon. In the Gulf of Alaska and Bering Sea most of the salmon observed in the catches of foreign trawlers have been chinooks. Based upon current knowledge, it appears that the cumulative catch of salmon by foreign trawlers is not large enough to seriously affect the resource. However, the increasing reliance upon midwater trawling, coupled with the faster towing speeds made possible by the use of more powerful engines in the foreign vessels, increases the opportunity to catch salmon. This situation requires continued scrutiny of foreign trawling operations, particularly in the case of new fisheries, such as the Soviet fishery for Atka mackerel in the Gulf of Alaska, where no background of observations is available to assess the potential impact on salmon.

Although there are many species of commercially desirable bottomfishes in the Gulf of Alaska, many of which are the object of foreign fisheries, the only species now utilized to any extent by U.S. fishermen are halibut and sablefish. Reasons for this anomalous situation include distance from established U.S. markets and lack of suitable processing facilities, but a large contributing factor has been that foreign fishing has reduced stock densities of the most desirable species to levels where they no longer yield catch rates at which U.S. fishermen can afford to fish. The early foreign fisheries enjoyed the advantage of operating at high catch rates by fishing on previously unutilized stocks. Later, the foreign governments subsidized some of the costs required to develop harvesting and processing technology and to introduce new species and products to the markets. The U.S. fishing industry will not enjoy the same advantage unless foreign fishing is reduced or stopped for a period of several years to allow the stocks to rebuild to higher levels of abundance.

The kinds of impacts on U.S. fisheries have been much the same from the distant-water fleets of all nations, but the degree of impact by each foreign nation has varied for several reasons. These factors include the size of the fishing and support operations by each nation (including the amounts of fish harvested, species sought, fishing gear and methods used); and the provisions contained in bilateral or other agreements with the U.S. and how well the provisions have been complied with.

Greatest impact from the standpoint of size of operations and catches in the Gulf of Alaska has been by the U.S.S.R., although recent Soviet catches have been smaller, compared to those of other nations, than they were through the mid-1960's. The degree of compliance of Soviet vessels to agreements with the U.S. is much more difficult to evaluate than for Japan. It appears that the Japanese generally try to abide with the onservation provisions of the agreements, but whether the Soviet record in this respect is better or worse than that of the Japanese cannot be determined because of the fewer observations made by U.S. personnel on Soviet vessels. The Soviets have tended to utilize midwater trawling to a greater extent than the Japanese, which could be expected to result in a lower incidence of halibut in Soviet trawl catches. On the other hand, the greater dependence by the Soviets on midwater trawling could result in a higher incidence of salmon in their catches. The longline-pot fisheries of Japan and South Korea are impacting directly on sablefish and are in competition with an established U.S. fishery for that species.

Overfishing has been the most difficult of all impacts to evaluate, particularly in regard to the U.S.S.R. which has provided the U.S. with statistics of only limited usefulness on its catches and fishing effort, and South Korea which has provided no useful statistics on its catches or effort. Statistics provided to the U.S. by Japan on its fisheries have been among the most detailed and useful that are made available by any nation in the world.

A possible, but not yet quantifiable, impact is that of low-priced imports of fishery products on the price U.S. processors can pay U.S. fishermen for the same species. If a significant factor, this could be one reason why the U.S. groundfish fishery in the Gulf of Alaska has not developed to anywhere near its physical capacity.

For lack of adequate statistics on the combined catches and fishing effort by all nations participating in the Gulf of Alaska fisheries for bottomfish, it has been difficult and, for some species, impossible to adequately assess the effects of fishing. Contributing to the problem of assessing the impact of fishing has been the pulse nature of the foreign fisheries which characteristically has resulted is massive fishing effort being generated on local stocks of fish with abundance quickly falling to unprofitable levels, at which time the fleets shifted their operations. U.S. investigators often have not been aware that this process was occurring until after the foreign fleets had abandoned their operation to move on to other stocks, species, or fishing grounds. Some improvement has occurred in recent years with the incorporation of safeguards into the fisheries agreements with Japan, U.S.S.R. and Poland in the nature of quotas on the catches of some species and provisions not to target on other species, as well as certain area-time and gear restrictions.

E. REGULATORY HISTORY

(1) *United States.* Fishery restrictions on U.S. nationals are those established by the State of Alaska and those promulgated by the International Pacific Halibut Commission (IPHC) for the taking of Pacific halibut. The State of Alaska requires all commercial fishermen landing any species of fish or shellfish in Alaska to possess a commercial fishing license, and the captain or owner of all fishing vessels are required to license their vessels and the fishing gear employed. Buyers are required to keep records of each purchase and show the number and name of the vessel, the State license number of the vessel, date of landing, pounds purchased of each species, statistical area in which the fish were caught, and the kind of gear used in taking the fish. Regulations pertaining specifically to bottomfish include some exclusions of the use of purse seines and pots in some districts of certain areas within the Gulf of Alaska at certain times of the year. The most substantive regulations on bottomfish in the Gulf of Alaska region

are in the Southeastern Area for sablefish, where a catch quota of 1,000,000 pounds is permitted between September 1 and November 15 in districts 9 through 15; fishing is permitted with no quota on catch between June 15 and November 15 in districts 1 through 8.

Restrictions by the IPHC on the taking of Pacific halibut pertain to licenses, gear, size limits, seasons, and catch quotas. Licenses issued by the IPHC are required for all vessels fishing for halibut, except those less than 5 net tons, or vessels which use hook and line gear other than setlines. As regards both commercial and sport gear, only hook and line gear is authorized by the IPHC for the taking of halibut.

(2) *Foreign nations.* The two kinds of restrictions placed on foreign nations have been:

(1) U.S. law establishing a 12-mile contiguous fishing zone (CFZ) within which all foreign fishing and activities in support of fishing are prohibited. This law was approved on October 14, 1966. Prior to then, foreign fishing was prohibited within U.S. territorial waters which extend 3 miles from shore.

Enforcement of the CFZ and territorial waters is accepted by nations fishing off the U.S. as a U.S. right and responsibility.

(2) Provisions contained in bilateral and other agreements signed by foreign nations with the U.S. These provisions usually have been agreed to through a negotiating process in which concessions have been made by foreign governments to U.S. fishery interests in exchange for concessions granted by the U.S. to the fishery interests of the other nations. Concessions granted by the U.S. have been in the nature of permission to fish or carry out activities in support of fishing at certain times and places within the CFZ. Concessions granted by foreign nations have been in the form of agreement not to fish at certain times and places on the high seas outside the CFZ, not to target on certain species, and not to exceed certain levels of catch (catch quotas).

Enforcement of the provisions of bilateral and other agreements in addition to the penalties imposed for violations are the responsibility of the individual nations. For example, the U.S.S.R. is responsible for enforcing and imposing penalties on its own nations for violations relating to fishing activities on the high seas, outside the U.S. CFZ.

Several restrictions on foreign nations in the form of catch quotas and area-time closures have been in effect in the Gulf of Alaska in recent years. Annual catch quotas for 1973–1976 are shown for Japan in Table 3 and for the U.S.S.R. in Table 4, according to INPFC area or, when applicable, to the Northeast Pacific Region which includes from the Gulf of Alaska south to California.

In 1976 Poland was limited to no more than four fishing vessels in the Gulf of Alaska. In addition, Poland agreed not to conduct specialized fisheries in 1976 for rockfish, sablefish, flatfish, anchovies, Pacific mackerel, herring, or shrimp.

Since 1972 South Korea has agreed not to fish for halibut in the Northeast Pacific Region. There are no other restrictions on the bottomfish fisheries of South Korea.

No official fisheries agreements have been signed with Taiwan.

Area-time closures and other restrictions pertaining to the fisheries of Japan, U.S.S.R., Poland, and South Korea are shown in Figures 2 through 6.

Table 3.--Limitations on catches (metric tons) of bottomfish by Japan.

Area	Species	1973-74	1975-76
Northeast Pacific Region	Groundfish other than rockfishes and sablefish	N.A.[1/]	30,000
Northeast Pacific Region	Rockfishes (including Pacific ocean perch)	N.A.	60,000
Northeast Pacific Region	Pacific ocean perch	60,000	N.A.
Northeast Pacific Region	Sablefish		
Trawl		N.A.	5,000
Longline		1971 level (25,000)	25,000
Northeast Pacific Region	Halibut	0	0

[1/] Not applicable.

Table 4.--Limitations on catches (metric tons) of bottomfish by the U.S.S.R.

Area	Species	1973-74	1975-76
Northeast Pacific Region	Pacific hake	150,000	150,000
Shumagin-Southeastern Region	Rockfishes (including Pacific ocean perch)	N.A.	10,000
Shumagin-Southeastern Region	Pollock	N.A.	40,000
Shumagin-Southeastern Region	Groundfish other than rockfishes and pollock	N.A.	30,000

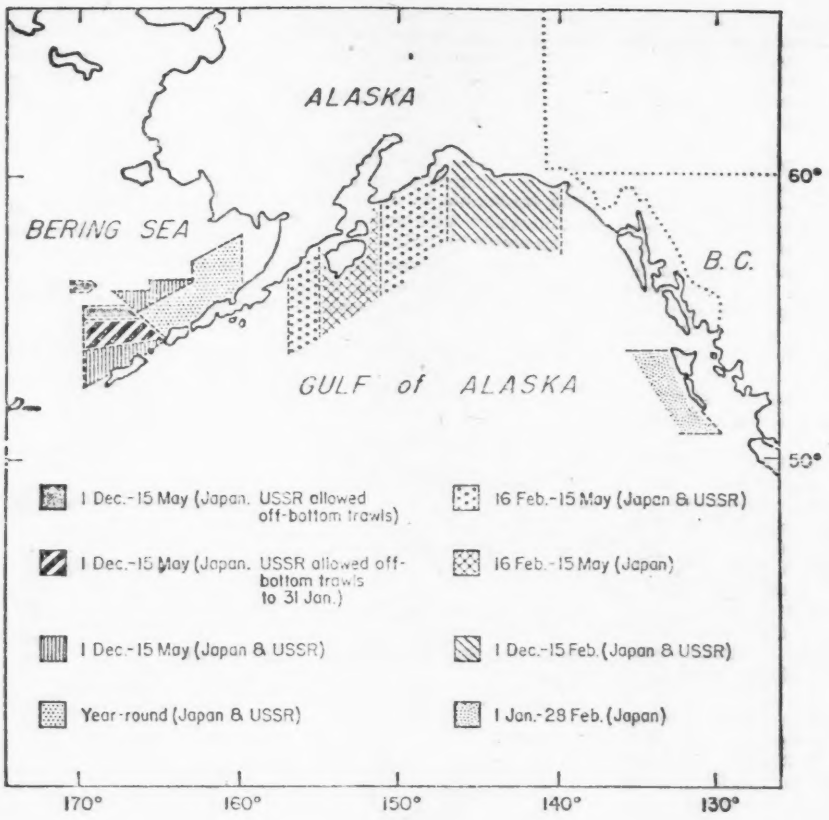

Figure 2.--Trawl closures for Japan and U.S.S.R. pertaining to halibut in the Bering Sea and Gulf of Alaska.

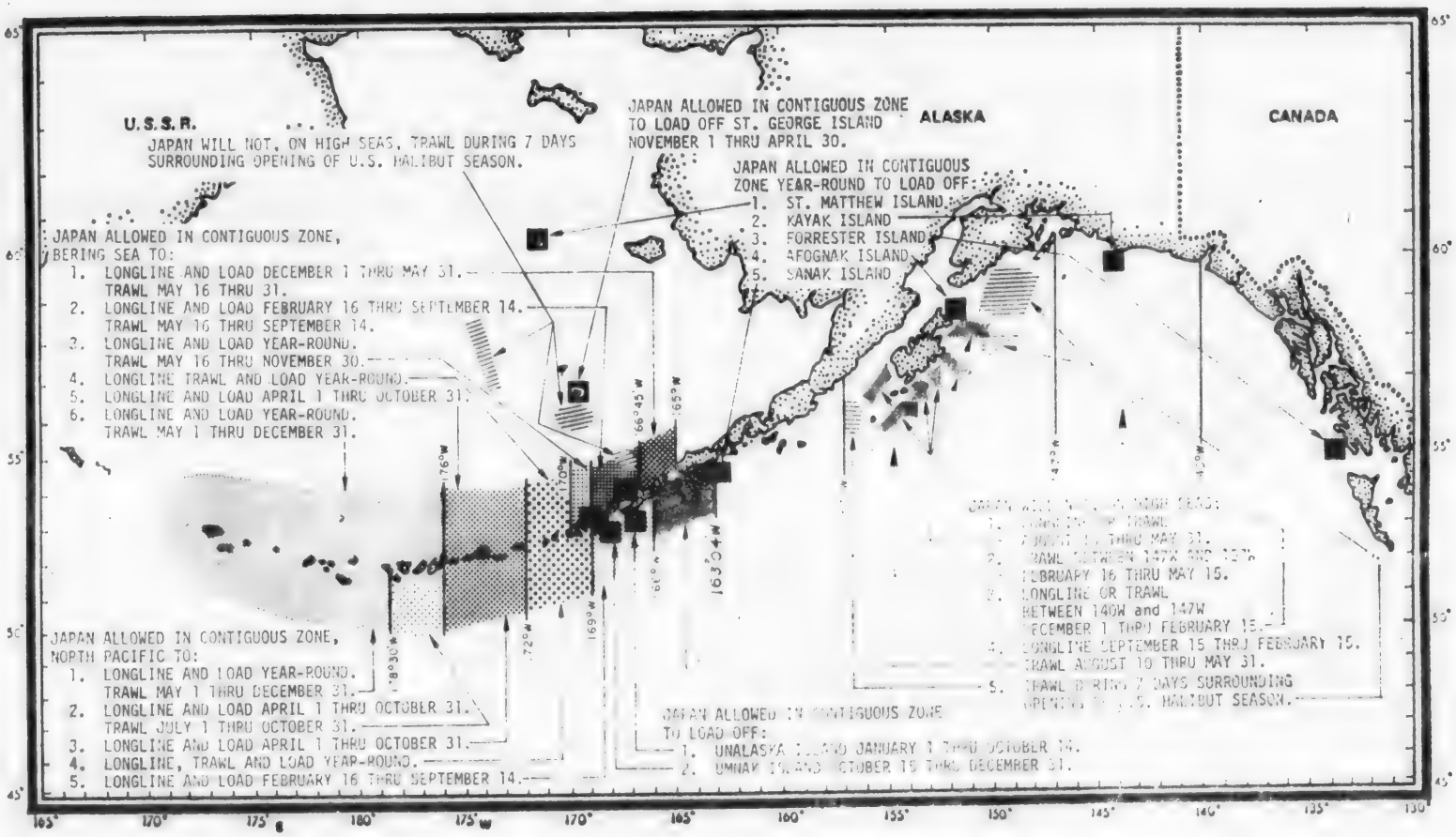
U.S.S.R.
JAPAN WILL NOT, ON HIGH SEAS, TRAWL DURING 7 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
JAPAN ALLOWED IN CONTIGUOUS ZONE, BERING SEA TO:
1. LONGLINE AND LOAD DECEMBER 1 THRU MAY 31.
TRAWL MAY 16 THRU 31.
2. LONGLINE AND LOAD FEBRUARY 16 THRU SEPTEMBER 14.
TRAWL MAY 16 THRU SEPTEMBER 14.
3. LONGLINE AND LOAD YEAR-ROUND.
TRAWL MAY 16 THRU NOVEMBER 30.
4. LONGLINE TRAWL AND LOAD YEAR-ROUND.
5. LONGLINE AND LOAD APRIL 1 THRU OCTOBER 31.
6. LONGLINE AND LOAD YEAR-ROUND.
TRAWL MAY 1 THRU DECEMBER 31.
JAPAN ALLOWED IN CONTIGUOUS ZONE, NORTH PACIFIC TO:
1. LONGLINE AND LOAD YEAR-ROUND.
TRAWL MAY 1 THRU DECEMBER 31.
2. LONGLINE AND LOAD APRIL 1 THRU OCTOBER 31.
TRAWL JULY 1 THRU OCTOBER 31.
3. LONGLINE AND LOAD APRIL 1 THRU OCTOBER 31.
4. LONGLINE, TRAWL AND LOAD YEAR-ROUND.
5. LONGLINE AND LOAD FEBRUARY 16 THRU SEPTEMBER 14.
JAPAN ALLOWED IN CONTIGUOUS ZONE TO LOAD OFF ST. GEORGE ISLAND NOVEMBER 1 THRU APRIL 30.
ALASKA
CANADA
JAPAN ALLOWED IN CONTIGUOUS ZONE YEAR-ROUND TO LOAD OFF:
1. ST. MATTHEW ISLAND
2. KAYAK ISLAND
3. FORRESTER ISLAND
4. AFOGNAK ISLAND
5. SANAK ISLAND
JAPAN ALLOWED IN CONTIGUOUS ZONE TO LOAD OFF:
1. UNALASKA ISLAND JANUARY 1 THRU OCTOBER 14.
2. UMNAK ISLAND OCTOBER 15 THRU DECEMBER 31.
65°
60°
55°
50°
45°
165°
170°
175° E
180°
175° W
170°
165°
160°
155°
150°
145°
140°
135°
130°

Figure 3.--Area-time closures and restrictions for Japanese trawl and longline fisheries in the Gulf of Alaska, effective through December 31, 1976.

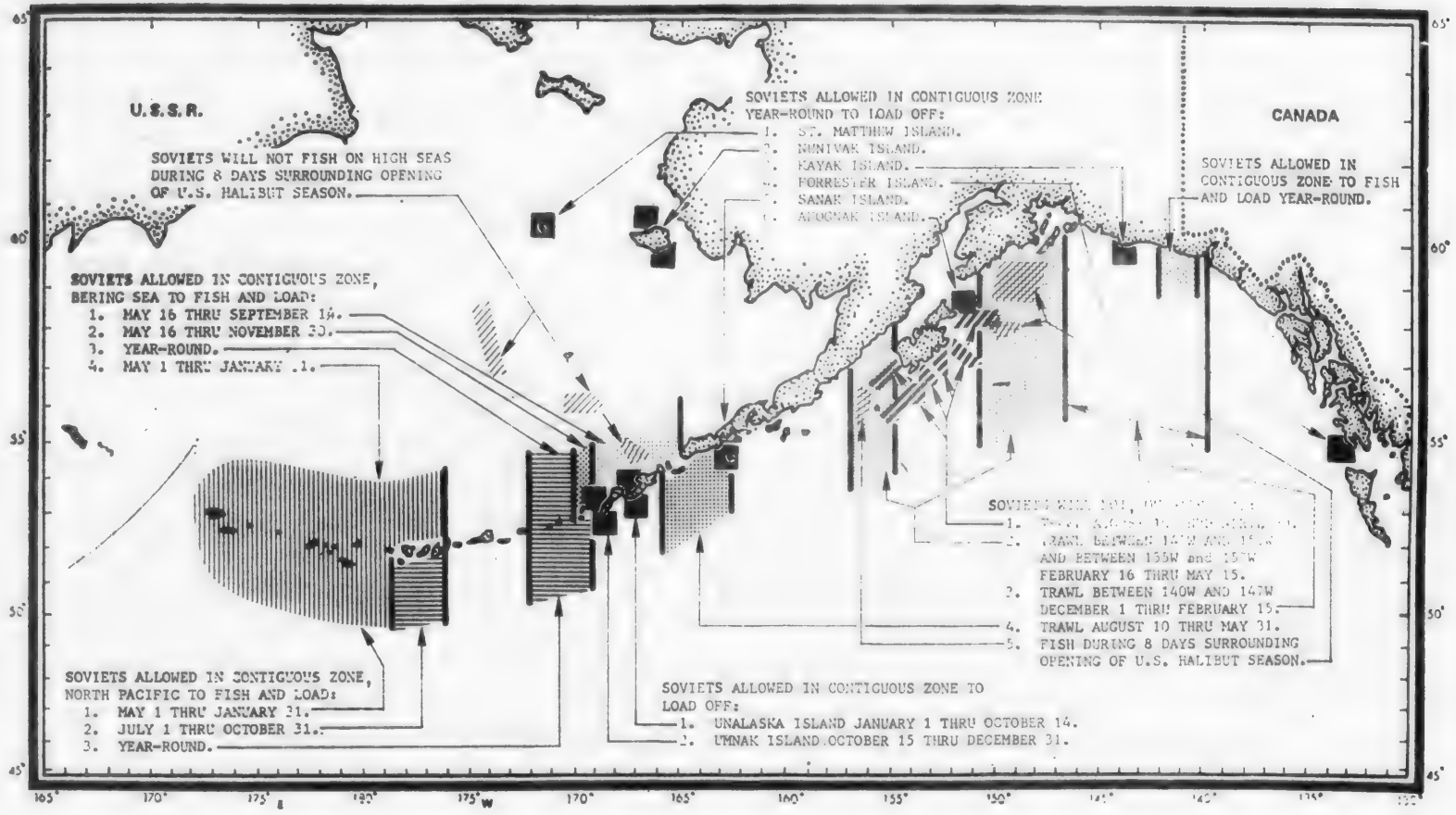
U.S.S.R.
CANADA
SOVIETS WILL NOT FISH ON HIGH SEAS DURING 8 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
SOVIETS ALLOWED IN CONTIGUOUS ZONE YEAR-ROUND TO LOAD OFF:
1. ST. MATTHEW ISLAND.
2. NUNIVAK ISLAND.
3. KAYAK ISLAND.
4. FORRESTER ISLAND.
5. SANAK ISLAND.
6. AFOGNAK ISLAND.
SOVIETS ALLOWED IN CONTIGUOUS ZONE TO FISH AND LOAD YEAR-ROUND.
SOVIETS ALLOWED IN CONTIGUOUS ZONE, BERING SEA TO FISH AND LOAD:
1. MAY 16 THRU SEPTEMBER 14.
2. MAY 16 THRU NOVEMBER 30.
3. YEAR-ROUND.
4. MAY 1 THRU JANUARY 31.
SOVIETS ALLOWED IN CONTIGUOUS ZONE, NORTH PACIFIC TO FISH AND LOAD:
1. MAY 1 THRU JANUARY 31.
2. JULY 1 THRU OCTOBER 31.
3. YEAR-ROUND.
1.
2. TRAWL BETWEEN 147W AND 155W AND BETWEEN 155W and 157W FEBRUARY 16 THRU MAY 15.
2. TRAWL BETWEEN 140W AND 147W DECEMBER 1 THRU FEBRUARY 15.
4. TRAWL AUGUST 10 THRU MAY 31.
5. FISH DURING 8 DAYS SURROUNDING OPENING OF U.S. HALIBUT SEASON.
SOVIETS ALLOWED IN CONTIGUOUS ZONE TO LOAD OFF:
1. UNALASKA ISLAND JANUARY 1 THRU OCTOBER 14.
2. UMNAK ISLAND OCTOBER 15 THRU DECEMBER 31.
65°
60°
55°
50°
45°
165°
170°
175° W
170°
165°
160°
155°
150°

Figure 4.--Area-time closures and restrictions for Soviet trawl fisheries in the Gulf of Alaska, effective through December 31, 1976.

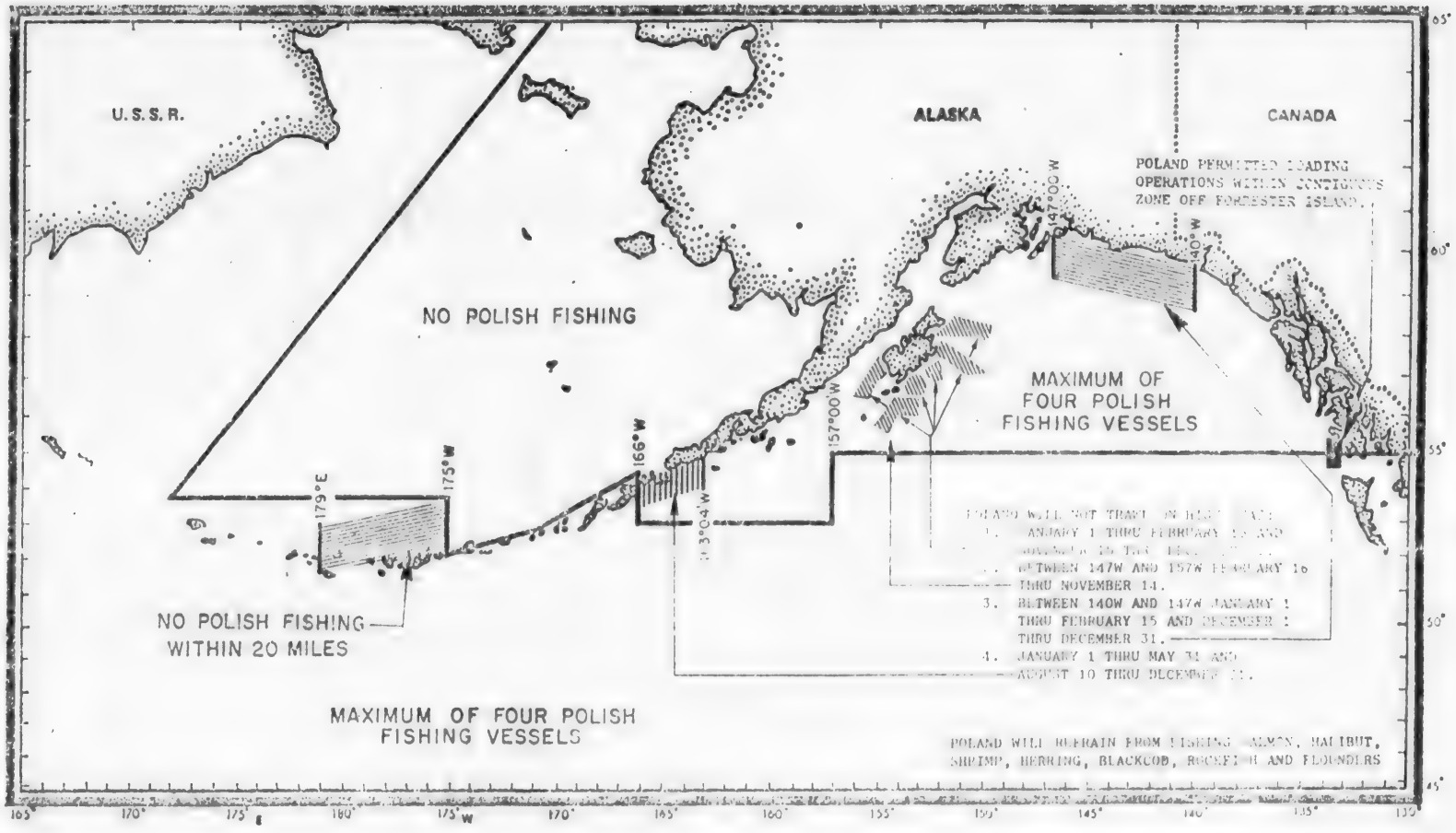

Figure 5.--Area-time closures and restrictions for fisheries of the Polish People's Republic in the Gulf of Alaska. effective through December 31, 1976.

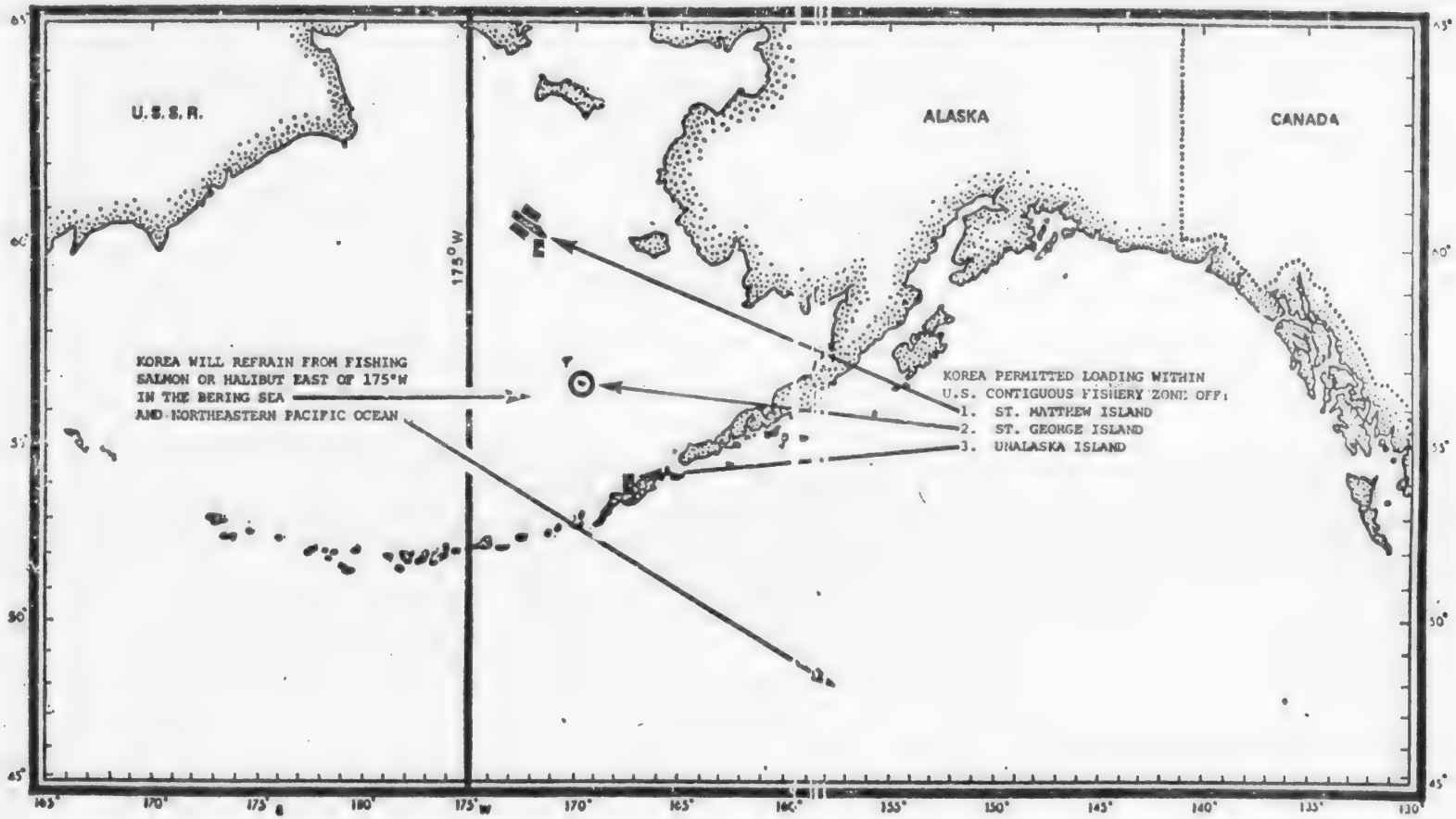

Figure 6.--Provisions of the United States-Republic of Korea Fisheries Agreement effective through December 12, 1977.

F. VIOLATIONS AND GEAR LOSSES

Violations and gear losses in the Gulf of Alaska can be categorized as (1) violations of international agreements, (2) violations of U.S. waters and continental shelf resources, (3) losses of crab pots, and (4) losses of halibut skates to foreign fisheries. For convenience, these violations and gear losses are summarized below, by nation.[2] Not included in the following summaries are violations by foreign vessels fishing for crab, shrimp, or salmon, which will be discussed in the preliminary management plans for those fisheries.

A summary of violations of U.S. waters and continental shelf resources is provided below in Table 5.

TABLE 5

NUMBER OF DOCUMENTED VIOLATIONS BY FOREIGN VESSELS OF U.S. WATERS AND CONTINENTAL SHELF RESOURCES IN THE GULF OF ALASKA

Nation:	*Number of violations*
U.S.S.R	-----
Japan	6
South Korea	3
Taiwan	1
Canada	2
Total	12

As may be seen in the preceding table, Japan accounted for 6, or 50 percent, of the documented violations. Considering the large size of its fishing operations, the lack of violations by the U.S.S.R. is surprising. The six violations by Japan in the Gulf of Alaska consisted of four CFZ violations by longliners fishing for blackcod and one CFZ violation by a trawler fishing for groundfish. Two of the three violations by South Korea in the Gulf of Alaska were by longliners fishing for sablefish inside the CFZ; the other was by a trawler fishing for groundfish inside the CFZ. The violation by Taiwan in the Gulf of Alaska was by a longliner fishing for sablefish inside the CFZ. All three violations by Canada were by longliners fishing in U.S. territorial waters.

A summary of the violations of international agreements is provided in Table 6.

TABLE 6

NUMBER OF DOCUMENTED VIOLATIONS OF INTERNATIONAL AGREEMENTS BY FOREIGN VESSELS IN THE GULF OF ALASKA, 1961 TO APRIL 1976

Nation:	*Number of violations*
U.S.S.R	2
Japan	5
Canada	4
Total	11

The violations by the U.S.S.R. were both for trawling in a fixed gear area off Kodiak Island. The violations by Japan consisted of one trawler fishing in a fixed gear area off Kodiak and four longliners possessing halibut east of the abstention line. All four violations by Canadian vessels were for longlining for halibut in closed areas or seasons.

The numbers of U.S. crab pots reported as having been lost to foreign fishing vessels are summarized in Table 7 according to nation causing the losses.

As can be seen from Table 7, Soviet vessels have accounted for a very high proportion of the losses. Not shown in Table 7 is the great reduction in the number of pot losses that has occurred in recent years.

TABLE 7

NUMBER OF U.S. CRAB POTS REPORTED LOST TO FOREIGN VESSELS, 1963 TO APRIL 1976

Nation causing loss:	*Number of losses*
U.S.S.R	183
Japan	41
South Korea	—
Unknown	[1] 108
Total	232

[1] Including 64 believed lost to Soviet vessels.

The number of skates of halibut gear reported as having been lost by North American fishermen are summarized below in Table 8 according to nation causing the losses. Not shown in the table, but as also noted for crab pots, there has been a significant reduction in the loss of halibut gear in recent years.

TABLE 8

NUMBER OF SKATES OF HALIBUT GEAR LOST BY NORTH AMERICAN FISHERMEN, 1963 TO APRIL 1976

Nation causing loss:	*Number of losses*
U.S.S.R	132
Japan	34
South Korea	10
Unknown	2
Total	178

As shown in Table 8, Soviet vessels have caused the most losses of halibut gear, as also was noted for crab pots.

G. COOPERATIVE RESEARCH AND STATISTICAL EXCHANGE

(1) *Cooperative research.* Several kinds of cooperative research have been carried out on the bottomfish resources and fisheries of the Gulf of Alaska. The major kinds of cooperative research have been:

(1) Visits of U.S. and foreign scientists in laboratories and aboard vessels of the other country to become familiar with each other's research techniques, goals, and results.

(2) Exchange of scientific samples, data, and technical papers.

(3) Meetings of scientists to discuss results of research and to plan for future studies.

(4) Sampling by U.S. observers of commercial catches aboard foreign vessels.

(5) Joint operations of research vessels in cooperatively designed field programs.

Cooperative research in several of the above areas has been carried out with Japan and they have produced many tangible results of benefit to the U.S. These cooperative endeavors have been facilitated by the existence of the International North Pacific Fisheries Commission which has served as a forum for discussions and exchange of data and reports between the scientists of the U.S., Canada, and Japan.

Cooperative research with the U.S.S.R. has been less extensive than with Japan and has produced few tangible benefits to the U.S. in the Gulf of Alaska. The major obstacle to meaningful cooperative research with the U.S.S.R. has been the absence of a set of mutually agreed upon objectives and priorities in addition to a forum which allows as much dialogue as necessary to arrange the complicated logistics of joint field activity and agreed upon aproaches to reaching mutual objectives. Another factor in the U.S. view has been the tendency of the Soviets to propose cooperative ventures which essentially were requests to have an American placed on their vessel so it would be allowed to operate within the contiguous fishing zone of the U.S. The work to be done aboard the Soviet vessel often had little relevance to U.S. research priorities and was designed entirely by the U.S.S.R. Hence, the "cooperation" involved was more a case of the U.S. facilitating a Soviet work program than it was a truly cooperative research activity.

Cooperative research with South Korea has consisted of having an investigator from there spend a few weeks at the Northwest Fisheries Center and aboard a NOAA research vessel to become somewhat familiar with procedures used by U.S. investigators. Limited discussions have been held between U.S and South Korean investigators at three technical workshops. No research results have been provided at these workshops by South Korea on the bottomfish resources of the Gulf of Alaska.

(2) *Exchange of statistics on fishing operations.* Statistics provided to the U.S. by Japan on its fishing operations in the Gulf of Alaska have been among the most detailed and complete of those collected by any nation in the world. They contain much detail on area of origin of catches, species caught, size and kind of vessels used, fishing gear employed, and time period. An exception to this general rule in the Gulf of Alaska has been the statistics for Japan's Longline-Gillnet Fishery, which began in 1963 but whose catches were not fully reported until 1968. This apparently was because of confusion in Japan's licensing system, which resulted in the catches either being unreported or reported in such a way that they were erroneously attributed to other areas.

Statistics provided by the U.S.S.R. have been greatly inferior to those provided by Japan. From 1959 when the Soviets began commercial operations off Alaska until 1964, no statistics were provided on catches except what can be inferred from scientific reports published on a few species. In 1964, the U.S.S.R. began providing the Food and Agriculture Organization (FAO) of the United Nations with figures on the catches of certain species in the eastern North Pacific. However, the catch area identified by the Soviets essentially included all fishing grounds in the eastern North Pacific between northern California (lat

40°30′ N) and Cape Prince of Wales, Alaska (lat 65° N), and offshore to long 175°00′ W which in the north intercepts the Chukchi Peninsula of the Soviet Union at East Cape, just south of the Arctic Circle (FAO Statistical Area 67). Catches for such a huge area are of extremely limited value in assessing the impact of fishing on individual stocks of fish and shellfish which typically inhabit much smaller areas and is in stark contrast to the detailed statistics on catches which were published or otherwise made available by the United States, Canada, and Japan for those years.

As a result of a bilateral fisheries agreement concluded between the United States and the U.S.R.R., statistics on the fisheries of the two nations in the eastern North Pacific were exchanged, beginning in 1967. However, for most of the period since 1967 the data provided by the Soviets have lacked detail on the area of capture and on the species harvested. The practice, until recently was to provide data on catches of only a few primary target species and to combine the catches of all remaining species in a "miscellaneous" or "other species" category. On a few occasions this has led to the anomalous situation whereby the reported catch of miscellaneous or other species approached or even exceeded the reported catches of some of the target species.

Another problem in evaluating the impact of Soviet fisheries has been the difference, sometimes occurring, between the sizes of their reported catches and the quantities estimated by National Marine Fisheries Service (NMFS) personnel to have been caught while observing actual Soviet fishing operations from patrol aircraft and vessels. Such discrepancies between Soviet reports and observations by NMFS personnel also have occurred regarding the numbers and kinds of vessels involved in the fishing operations.

The best documented example of the above problem occurred with the development by the U.S.S.R. of a new fishery for pollock and flounders near Kodiak Island in the Gulf of Alaska. The fishery began in January 1973 when elements of the Soviet fleet, which formerly were assigned to fish for flounders in the eastern Bering Sea, were diverted to the Gulf of Alaska. The reported catch by the Soviets in this new fishery during January–April 1973 was 8,273 metric tons, compared to an estimated catch of 40,000 to 50,000 tons by NMFS personnel. According to observations by NMFS personnel, side trawlers accounted for almost one-half of the vessel days of effort expended in this fishery, but the Soviets reported that no side trawlers were involved in fishing. After a series of discussions by U.S. and Soviet officials concerning this large disparity between the observed and reported fishing, the Soviets provided U.S. scientists with a supplement, which showed an additional 7,000 metric tons of bottomfish as having been caught by side trawlers. However, this still left a shortage of at least 25,000 metric tons between the revised catch figure of 15,000 tons reported by the U.S.S.R. and the catch of 40,000 to 50,000 tons estimated by NMFS personnel.

Regarding other nations fishing for bottomfish in the Gulf of Alaska, Poland has provided detailed statistics on its limited operations there; South Korea and Taiwan have not provided the U.S. with any useful statistics on their fisheries. Canada provides the same detailed statistics as does the U.S. on its fishery for halibut in the Gulf and has made available comprehensive statistics on such other minor fishing as is carried out there for other kinds of bottomfish.

3.0 Status of Stocks

A. General Distribution and Abundance

The species of traditional importance to the area's trawl fisheries are listed in Table 9; their relative abundance can generally be inferred from the magnitude of recent catches. Throughout the 15 year history of the Gulf of Alaska trawl fishery, Pacific ocean perch (including minor amounts of other rockfish species not discernible in the catch statistics) have dominated the all-nation catch. Other major components of the area's fisheries include the North American setline fishery for halibut (with catches ranging from 10,000–30,000 metric tons) and a substantial Japanese, and more recently ROK, setline fishery for sablefish. Within the trawl fishery, walleye pollock has become second in importance in the all-nation catch followed by flounders and Atka mackerel.

Pacific ocean perch, flounders (a group of about six species), and sablefish are abundant throughout the region; Atka mackerel and pollock are most abundant in the western portion of the Gulf of Alaska. Pacific ocean perch, sablefish, and the various flounder populations are believed to be distributed in more or less discrete and localized stocks throughout the region with varying amounts of interchange between them. The structure of pollock and Atka mackerel populations is not known. There appears to be little association between the pollock populations in the Gulf of Alaska and the eastern Bering Sea; therefore, for purposes of management they should be viewed as distinct stocks.

Table 9.--Groundfish catches (approximate) from the Gulf of Alaska, 1967-75.

Species	Country	1967	1968	1969	1970	1971	1972	1973	1974	1975
		(1000's mt)								
Rockfishes (primarily POP)	U.S.	0	0	0	Tr	0	0	Tr	Tr	?
	U.S.S.R.	66	45	19	1/	10	24	4	17	10
	Japan	54	56	55	45	49	53	58	38	?
	ROK	0	0	0	0	0	3	3	1/	?
	Poland	0	0	0	0	0	0	Tr	Tr	Tr
	Total	120	101	74	45	79	80	66	55	?
Pollock	U.S.	0	0	0	0	0	0	0	Tr	?
	U.S.S.R.	1/	1/	1/	1/	Tr	29	25	31	38
	Japan	6	6	18	9	9	14	7	30	?
	ROK	0	0	Tr	0	0	1	1	1/	?
	Poland	0	0	0	0	0	0	Tr	0	1
	Total	6	6	18	9	9	36	38	61	?
Atka mackerel	U.S.	0	0	0	0	0	0	0	0	0
	U.S.S.R.	1/	1/	1/	7	1/	6	11	16	20
	Japan	0	0	0	0	0	0	0	0	?
	ROK	0	0	0	0	0	0	0	0	?
	Poland	0	0	0	0	0	0	1/	Tr	1
	Total	0	0	0	7	0	6	11	16	?
Flounders	U.S.	0	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr
	U.S.S.R.	1/	1/	1/	1/	1/	1	1	2	2
	Japan	5	3	3	4	2	7	24	11	3
	ROK	0	0	0	0	0	0	0	1/	?
	Poland	0	0	0	0	0	0	1/	1/	Tr
	Total	5	3	3	4	2	9	26	13	5
Sablefish	U.S.	Tr	Tr	Tr	Tr	Tr	1	1	1	?
	U.S.S.R.	1/	1/	1/	1/	Tr	1	1	Tr	?
	Japan	5	15	19	24	25	26	22	23	?
	ROK	0	0	0	0	0	Tr	Tr	?	?
	Poland	0	0	0	0	0	0	1/	1/	1/
	Total	5	15	19	24	25	27	25	25	?
Halibut	U.S.2/	26	22	27	24	22	19	15	10	?
	U.S.S.R.	1/	1/	1/	1/	1/	Tr	Tr	Tr	Tr
	Japan	0	0	0	0	0	0	0	0	0
	ROK	0	0	0	0	0	0	0	0	0
	Poland	0	0	0	0	0	0	1/	1/	Tr
	Total	26	22	27	24	22	19	15	10	?
Others	U.S.	Tr	Tr	Tr	Tr	Tr	Tr	Tr	Tr	?
	U.S.S.R.	10	14	1	9	1	16	6	10	8
	Japan	5	4	3	3	2	3	7	8	?
	ROK	0	0	0	0	0	0	0	4	?
	Poland	0	0	0	0	0	0	Tr	Tr	1
	Total	15	18	4	12	3	19	13	22	?

1/ Catch, if any, included under "Others".
2/ Includes Canadian catch.

Most of these species are distributed beyond the Gulf of Alaska: Pacific ocean perch, Pacific halibut, walleye pollock, Pacific cod and sablefish all range from California northward around the Gulf of Alaska, into the Bering Sea, and along the Aleutian Island chain to the Asian coast; Dover sole from Baja California to the central Gulf; yellowfin sole from British Columbia to the Bering Sea and off the Asian coast; and Atka mackerel from the central Gulf through the Aleutians and into the southeastern Bering Sea. For the purposes of management, stocks of all of these species—except Pacific halibut—in the Gulf of Alaska are considered to be distinct from those of the same species in other regions.

B. CURRENT STATUS

(1) *Walleye Pollock.* There is reason to believe that the population of this species in the Gulf of Alaska has been increasing both in distribution and abundance. During 1972–1975, the National Marine Fisheries Service conducted resource assessment surveys in this region from which first order approximations of standing stock and potential yield have been calculated (Alton, 1976).

Using the area-swept method, and assuming the catchability coefficient (c) to be between 0.5 and 1.0, exploitable biomass was estimated to be 1.1–2.1 million metric tons. Assuming natural mortality (M) to be 0.4 (M for pollock in the Bering Sea has been estimated by Japanese scientists to be 0.43), and applying the Alverson and Pereyra (1969) equation, a rough estimate of potential yield is 168,000–338,000 metric tons.

Although little is known of this population's stock structure, removals from the Kodiak sub-area (see Figure 1) have approached the proportion of the potential yield which that sub-area's standing stock would be expected to produce (Table 10).

Table 10.--Highest annual pollock catch (1968-74) and provisional estimates of exploitable biomass[1/] and potential yield of pollock by INPFC Areas in the Gulf of Alaska.

Area	(metric tons) Exploitable biomass ($\bar{P}_w$)	Potential yield (MSY)	Highest annual catch and year taken
Shumagin	357,000-713,000	57,000-114,000	11,112 (1969)
Chirikof	340,000-680,000	54,000-109,000	9,084 (1973)
Kodiak	255,000-511,000	41,000-82,000	36,551 (1974)
Yakutat	78,000-155,000	12,000-25,000	1,745 (1973)
Southeastern[2/]	25,000-51,000	4,000-8,000	722 (1974)
All areas	1,055,000-2,110,000	168,000-338,000	58,097 (1974)

1/ $MSY = (0.4)(0.4)(\bar{P}_w)$

2/ No survey was conducted in Southeastern, $\bar{P}_w$ computed using CPUE from Yakutat Area.

(2) *Rockfishes.* Pacific ocean perch (*Sebastes alutus*) are widely distributed on the continental slope from Southern California to the Bering Sea. The species occurs along the Aleutian Islands and in the western Pacific Ocean as far south as off the Kurile Islands. On the basis of length composition, growth rates, fecundity, variations of year-class strengths and oceanographic conditions, Chikuni (1975) divided the resource into four stocks which are listed in order of their size and productivity—the Gulf of Alaska stock, the Aleutian stock, the eastern Pacific stock (British Columbia to off California), and the Eastern Slope stock (inhabiting the continental slope from southeastern Bering Sea to the Kurile Islands through the east coast of Kamchatka).

The Gulf of Alaska stock was virtually unutilized prior to 1960. With the entry into the region of Japanese and Soviet distant water trawlers in the early 1960's, however, the total catch in 1963 increased to 147,000 metric tons, reached a maximum of about 393,000 metric tons in 1965 and was in excess of 150,000 metric tons through 1968 (Chikuni, 1975).

There is consensus among fishery scientists of the U.S., Canada, U.S.S.R., and Japan that the Pacific ocean perch stocks of this region were severely overfished by these early fisheries and the stocks are now at relatively low levels of abundance (INPFC, 1975; Anon., 1974).

Status of stock studies have been based on yield per standing biomass analyses (Chikuni, 1975) and on CPUE trends related to stock production models (Larkins, 1974). All have clearly shown downward trends since the very early years of the fishery. U.S. scientists contend that the population has probably declined to a lower level than indicated by CPUE studies because effort has not been adequately adjusted to account for unquantifiable improvements in the fishing power of Japanese trawlers. In other words, an hour of trawling now represents a great deal more fishing power than an hour's trawling in 1966 because of larger engines and nets, improved hydroacoustic equipment and techniques for locating fish, extended search time, and experience on the part of the fishermen. When CPUE is based on catch per vessel-day rather than catch per hour, the downward trend is accentuated (Larkins, 1974).

Results of a recently concluded comparison of research vessel catch rates during similar cruises in 1961–62 (prior to the development of the large foreign trawl fisheries in the area) and 1975 indicate that the perch stocks in the central Gulf of Alaska are now no more than 20 percent of their virgin abundance (Hughes, et al, 1976). If this is representative of the region as a whole, perch abundance in the Gulf of Alaska will have to increase about 2½ times its current level to establish a stock size that would produce the potential MSY. On the basis of relations between catch and catch rates, U.S. scientists believe that equilibrium yield of Pacific ocean perch in the Gulf of Alaska under current conditions of stock abundance is about 50,000 metric tons (Larkins, 1974). Therefore, if the population was allowed to increase to 2½ times its current size (as suggested above) the surplus yield would be expected to increase to about 125,000 metric tons, at which time equilibrium yield would approximate MSY. Yield per recruit studies indicate the optimum age of recruitment to the fishery is 8 years, but the fishery in recent years has shifted substantially to younger age groups (Chikuni, 1975).

Because of the longevity and slow growth of this species, recovery of the perch population in the Gulf of Alaska to the level that would produce MSY will, under the best of conditions, be a matter of 8–15 years.

Little is known about the "Other Rockfish" complex except that it is much less abundant than Pacific ocean perch and small concentrations of various species occur in localized areas. Japan reportedly took some 3,000 mt and 8,000 mt of this complex in 1974 and 1975, respectively. Soviet rockfish statistics cannot be apportioned between Pacific ocean perch and other rockfishes. MSY and current equilibrium yield of this complex is tentatively and intuitively considered to be in the range of 5,000–10,000 mt.

In order to prevent overfishing of individual elements of this species complex—some of which are likely to be important to the developing U.S. fishery inasmuch as the Pacific ocean perch resource in its current poor condition cannot provide adequate catch rates—the TAC in 1977 will be set at the low end of the MSY range—5,000 mt.

(3) *Flounders.* Although data bearing on the status of flounder stocks is not good, recent NMFS resource assessment surveys in the central Gulf of Alaska indicate the standing stock of flounders to be 120,000–170,000 metric tons between 140°–147° W (NMFS, 1976). Expanding that estimate over the area of continental shelf and slope (10–200 f) in all of the Gulf (i.e., assuming flounder abundance to be generally uniform throughout) results in an apparent standing stock of 500,000–700,000 metric tons.

Assuming further that natural mortality (M) averages 0.2 for the complex, and that the complex is close to being in a virgin state, application of Alverson and Pereyra's (1969) equation results in a first approximation of potential yield of 50,000–70,000 metric tons.

The above estimate refers to a diverse complex of individual species and stocks. Until the abundance, distribution, and population attributes of each are more clearly known, an attempt to achieve the overall MSY is likely to result in the overexploitation of some species/stocks, especially if fishermen seek certain species over others because of market preferences. Attainable MSY (MSY'), therefore, is considered to be 75 percent of the low end of the theoretical range—37,500 mt.

(4) *Sablefish.* This species is dealt with thoroughly in the separate Preliminary Fishery Management Plan for Sablefish of the Bering Sea and Northeastern Pacific Ocean for 1977.

CPUE and population dynamics analyses indicate that the MSY for sablefish stocks in the Gulf of Alaska is 22,000–25,000 metric tons (Low, 1976). The upper limit of the range was exceeded in 1972 and 1973 and, with the intervention of the ROK longline fishery, probably was exceeded again in 1975 and 1976. After years of relative stability, abundance has been declining in recent years and equilibrium yield is believed to be near the low end of the MSY range—22,000 mt.

In order to isolate this fishery from others of the region and to manage it as a separate entity for optimum yield, foreign target production will be limited to setline gear with allowances for only a small incidental catch in the trawl fishery. Accordingly, of the 22,000 metric ton TAC, the only catch permitted foreign trawlers will be 2 percent of their allowed total catch of all other species. (This incidental catch is expected to be about 4,000 metric tons).

For measures applying to the sablefish setline and trap fishery, see the separate Preliminary Management Plan for Sablefish.

(5) *Atka Mackerel.* Virtually nothing is known about the life history, distribution, or abundance of this species. There is no reason to believe that the current catch level exceeds MSY; neither, however, is there evidence to support a contention that MSY is much greater than the current level of catch. Therefore, the TAC for Atka mackerel in the Gulf of Alaska will be established, on a preemptive basis, at 125 percent of the 1974 catch, or 22,000 metric tons.

(6) *Pacific Cod.* Little is known of this species in the Gulf of Alaska. Cursory examination of catch statistics for the region indicates that in relation to other commercial groundfish species it is of relatively low abundance. There is no reason to believe that the current catch level exceeds MSY; neither, however, is there evidence that substantially higher catches can be sustained. Therefore, TAC for 1977 will be set, on a preemptive basis, at 125 percent of the 1974 catch, or 6,300 metric tons. On the basis of information concerning this species in other regions, large, natural fluctuations in recruitment (hence abundance) might be expected.

(7) *Pacific Halibut.* Because of its special and historic importance to North American fishermen and their demonstrated ability to harvest much more than the expected TAC,[4] and because of the declining abundance of the species in the Gulf of Alaska (IPHC, 1976), no allocation of halibut can be considered for foreign fishermen.[5] Furthermore, because of the adverse effects on halibut by fisheries for other species (Hoag and French, 1975; IPHC, 1974) special measures will be invoked on trawl operations to minimize the incidental mortality they cause halibut.

(8) *Other species.* Little information concerning abundance, stock units, stock condition, or potential yield is available for the variety of minor species presumably included in the reported catches of this statistical category.

If the fishery seeks certain components and purposely avoids others, or if certain components are mixed with major target species and taken incidentally while others are not, exploitation rates would be grossly disproportionate among the components. This could easily lead to overfishing of certain species or localized stocks if the allowable catch for this category is a significant portion of the total catch for the entire fishery.

4.0 Total Allowable Level of Foreign Fishing

A. Optimum Yield (Preliminary Determination)

The concept of optimum yield incorporates consideration of a broad range of socio-economic factors relating to impacted fisheries, as well as the biological characteristics of the exploited stocks. In the time and with the data available, it has not been possible to make other than a cursory evaluation of socio-economic factors; hence for the purpose of this preliminary management plan optimum yields are considered as equivalent total allowable catches (TACs). These figures have been determined on the basis of biological information concerning the characteristics of exploited resources, with certain adjustments to accommodate for the quality of the data base. Although regulations in this preliminary plan deal only with the activities of foreign vessels, the reduction in fishing levels implied by the TACs in this plan should result in improved stock conditions and, therefore, improve the economic viability of U.S. fisheries. Further adjustments of TACs to attain optimality are anticipated in succeeding iterations of the management plan.

B. Total Allowable Catch

Pertinent information concerning stock condition, sustainable yields under current conditions, domestic production potentials, and the surplus available for foreign use is summarized in Table 11.

Rationales for differences, where they occur, between maximum sustainable yields (or equilibrium yields) and total allowable catches are as follows.

(1) *Walleye Pollock.* Because of the provisional nature of the survey data, a lack of biological data from which critical population parameters can be determined and the imprecise procedure used to estimate potential yield, TAC for 1977 will be set 25 percent below the minimum estimate of MSY—or 126,000 metric tons. This catch level will permit more than 100 percent increase in total catch over that of 1975 while allowing an evaluation of fishery performance at the higher production level, providing an opportunity for improving the biological data base that might justify additional removals in the future and preventing localized overfishing if more than one stock is involved.

(2) *Rockfishes.* Inasmuch as the condition of the Pacific ocean perch resource is known to be poor, and recognizing the relatively slow response to management inherent in such long-lived and slow-growing species, a rational management strategy for rebuilding the population would be to limit the all-nation removals of Pacific ocean perch to well below the level that is believed to currently represent equilibrium yield (50,000 mt). Therefore, TAC for this species in 1977 is set at 30,000 mt. At this harvest level abundance is expected to increase to the level that will produce MSY in about 11 years.

(3) *Flounders.* In determining the TAC for this species complex, two considerations require a conservative departure from the previously described MSY'. First, the currently available biological data base is limited and a gross simplistic estimating procedure for MSY' was used. Second, many of the flounder species exhibit a distributional pattern similar to that of Pacific halibut. The latter species—a traditional target of the carefully managed North American setline fishery—is in a serious decline, one cause of which is the continuing mortality induced by its incidental capture in foreign trawl gear. Increased fishing for the flounder complex is likely to cancel the halibut savings expected from key winter time-area closures of several years standing and further aggravate an already serious economic and social crisis in the U.S. halibut fishery.

Therefore, taking into account the weak data base from which MSY' was estimated and the special needs of the halibut resource and fishery, TAC for the flounder complex in 1977 will be set at 23,500 mt, mid-way between the MSY' of 37,500 mt and the average of the 1974–75 (most recent years of record) catch

of 9,500 mt. This allows a 147 percent increase from the 1974–75 average catch.

This approach, if followed in succeeding years, will permit the fishery to move quickly but in a controlled fashion toward MSY' while providing time and additional data for the refinement of a management strategy for optimizing total yield of the flounder complex, and for assessing and minimizing the incidental impact on halibut.

(4) *Other species.* The TAC for this species category in 1977 will be set 10 percent below the last catch of record—to 16,200 mt—with the intention of similar reductions in each succeeding year until it reaches no more than 2 percent of the total catch of the fishery. This phased reduction is intended to:

(a) prevent circumventing individual species allocations by reporting significant overages in a large "Other" category;

(b) prevent excessive exploitation of small or previously unfished stocks which are unregulated because of a lack of fishery or biological data; and

(c) to force more precise statistical reporting for resource assessment and management purposes.

Table 11.--Total allowable level of foreign fishing.

Species	Data base	1974 U.S. catch	1974 foreign catch	Est. MSY	Est. E.Y.	Status	1977 TAC	U.S. capacity	Total allowable level of foreign fishing
Pollock	Fair	Tr.	61,000	168,000-338,000	--	Healthy; underutilized except near Kodiak where foreign catches may be approaching low end of MSY range.	126,000	1,000	125,000
Pacific ocean perch	Good	Tr.	55,000	125,000	50,000	POP overfished in mid-1960's, no recovery since. Condition of "Other rockfish" complex unknown.	30,000	1,000	29,000
Other rockfishes	Poor	Tr.		5,000-10,000	--		5,000	1,000	4,000
Flounders	Fair	Tr.	11,000	37,500	--	Complex underutilized; some species or stocks may be fully or over utilized.	23,500	3,000	20,500
Sablefish	Good	800	25,000	22,000-25,000	22,000	Fully utilized in 1974; growth of ROK fishery in 1975-76 probably resulted in MSY being exceeded.	22,000	2,500	19,500--Incidental catch only in trawl fishery, not to exceed 2% of total trawl catch.[1]
Atka mackerel	Poor	0	18,000	≥22,000	--	Unknown; no signs of overfishing.	22,000[2]	0	22,000
Cod	Poor	Tr.	5,000	≥ 6,300	--	Unknown; recruitment probably quite variable due to environmental factors.	6,300[2]	4,000	2,300
Halibut	Excellent	9,700	Tr.	20,000	(10,000?)	Overfished; recovery being hampered by mortality induced by incidental trawl catch	(10,000?)[3]	10,000	0--No incidental catch allowed, must be immediately discarded when taken.
Others	Poor	Tr.	18,000	N.A.[4]	N.A.[4]	N.A.[4]	16,200	0	16,200

1/ See separate Preliminary Management Plan for Sablefish Setline and Trap Fishery.
2/ Preemptive; 125% of 1974 catch.
3/ To be set by International Pacific Halibut Commission.
4/ Not applicable.

5.0 Conservation and Management Measures Applicable to Foreign Fishing

A. REGULATIONS

The management policy for the Gulf of Alaska shall be first to assure an adequate potential for the development of new U.S. fisheries; second to protect the halibut resource so that it may rebuild to the level that will provide MSY; and third to allow foreign fishing consistent with the above and in a manner that will allow rebuilding of overexploited stocks and prevent overfishing of currently healthy stocks.

Foreign fishing vessels must obtain a permit from the Secretary of Commerce before operating in this Management Unit.

(1) *Region-wide restrictions on foreign trawling.* a. No retention of salmon, halibut, or Continental Shelf Fishery Resources (to prevent covert targetting on species of special importance to U.S. fishermen).*

b. No fishing for shrimp (fully utilized by U.S. fishery).†

c. No fishing for herring (heavily utilized by U.S. fishermen in eastern Gulf; important forage for other species).††

d. No trawling within 12 miles of the baseline used to measure the Territorial Sea (to prevent conflict with U.S. fixed gear and small U.S. inshore fishing vessels; to prevent catch of inshore species; e.g., shrimp, important to U.S. fishermen.)*

(2) *Time-area closures (Figure 7).* a. The six "Kodiak Gear Areas" which have been part of the bilateral agreements with Japan and the U.S.S.R. for several years will be continued. Accordingly, these areas (Appendix A) will be closed to foreign fishing August 10-May 31 (to prevent conflicts with U.S. crab pots and halibut setlines).*

b. 58°30′ N to 59°30′ N, between 147°40′ W and 150°20′ W; 57°40′ N to 58°05′ N, between 148°50′ W and 150°30′ W; 55°30′ N to 56°25′ N, between 155°45′ W and 156°30′ W closed to foreign trawling from 5 days prior to 5 days after the opening of U.S. halibut setline fishery (to prevent disturbing halibut grounds during early part of U.S. halibut season).‡

c. 163°04′ W to 166° W closed to foreign trawling year round (to provide sanctuary for developing U.S. groundfish fishery in the Dutch Harbor-Sand Point area).‡

d. 147° W to 157° W closed to foreign trawling from February 16 to May 15 (to reduce incidental catch and attendant mortality of halibut during period of high availability of that species to trawls; to protect spawning concentrations of rockfish and flounders).*

e. 140° W to 147° W closed to foreign trawling from December 1 to February 15 (to reduce incidental catch and attendant mortality of halibut during period of high availability of that species to trawls; to protect spawning concentrations of rockfish and flounders).*

f. The entire region shall be closed to trawling for the remainder of calendar year to the fishermen of a nation when that nation's annual trawl allocation of any species listed in the preceding table is reached (to discourage foreign fleets from targeting on depleted species/stocks and to prevent any further bycatches after the allotted catch has been taken. This provision places the burden of responsibility on the foreign fleets to avoid targeting on such species/stocks and to develop fishing gear and fishing practices which will minimize or eliminate their incidental capture).‡

*Identical to current bilateral arrangements.

†Similar to current bilateral arrangement but somewhat more restrictive.

‡New restriction.

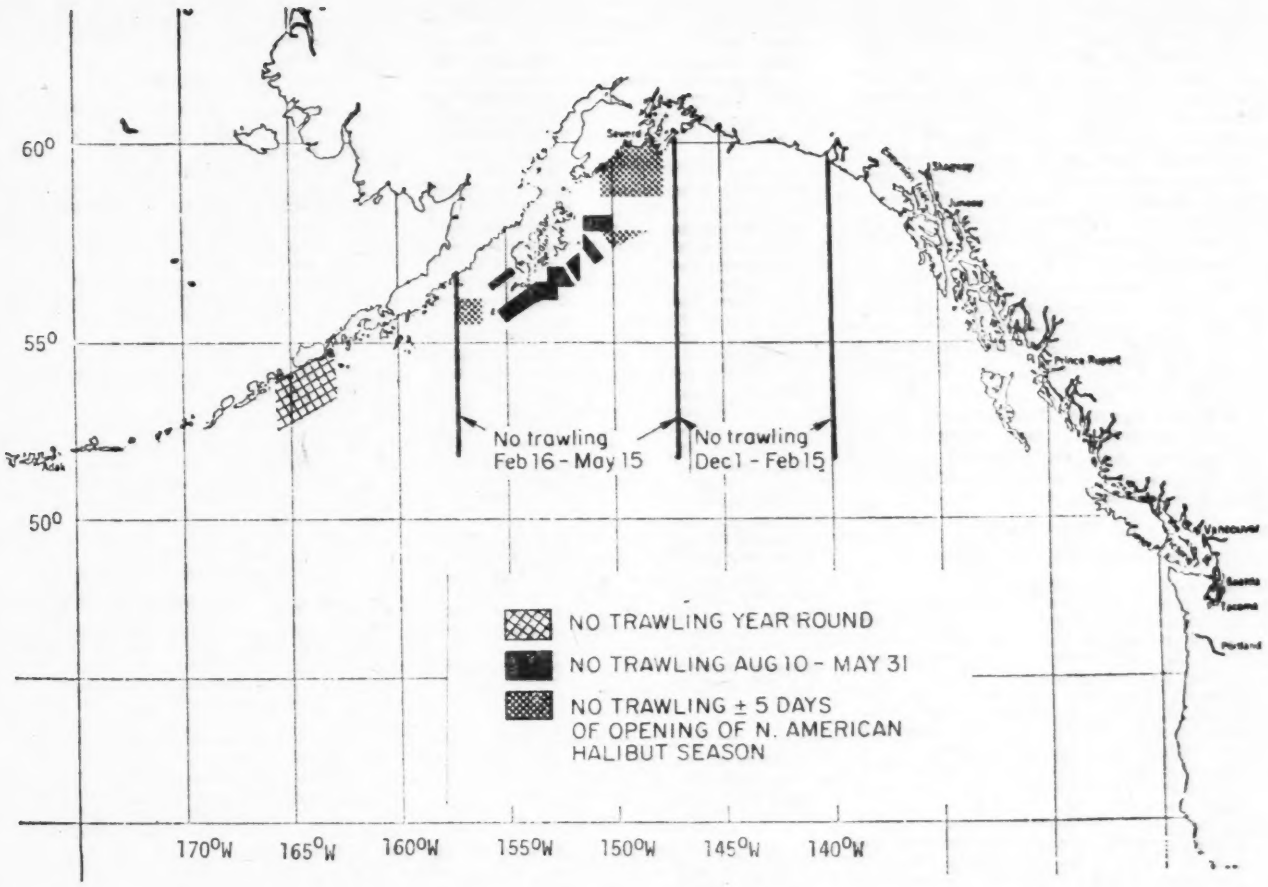

Figure 7.--Time area closures pertaining to foreign fishermen in the Gulf of Alaska.

B. STATISTICAL REPORTS

(1) *Annual.* Each nation whose fishermen operate in the Region shall report [6] by May 30 of the following year annual catch and effort statistics, as follows: *effort* in hours trwaled, by vessel class, by gear type, by month, by ½° (lat) × 1° (long) statistical area; *catch* in metric tons, by vessel class, by gear type, by month, by ½° (lat) × 1° (long) statistical area, by the following species groupings: rock sole, flathead sole, arrowtooth flounder, other flounders, Pacific ocean perch, other rockfishes, Pacific cod, sablefish, Alaska pollock, Atka mackerel, any other species taken in excess of 1,000 metric tons, and other fishes.

(2) *Monthly.* In addition to the annual statistical report in 5.B.1 above, each nation will report [6] by the end of the following month, provisional fishery information as follows: Effort in vessel-days on the grounds by vessel class and gear-type; and catch in metric tons of flounders, rockfishes, cod, pollock, sablefish, Atka mackerel, and others, for each of the following areas (Figure 1): Charlotte, Southeastern, Yakutat, Kodiak, Chirikof, Shumagin.

C. FLEET DISPOSITION REPORTS

The appropriate fleet commander or individual vessel master will report [6] by radio prior to the commencement of fishing, the arrival in the Region of each fishing and processing vessel, giving the vessel's name and other identifying marks, size, and intended target species. A similar report [6] will be made at the time of departure of each vessel from the Region. These reports, augmented with U.S. surveillance observations and monthly catch and effort reports, will be used to monitor adherence to limitations.

D. OBSERVERS

All vessels of each nation operating in the Region will have available at no cost to the U.S. accommodation for one U.S. observer. Observers will be assigned to individual vessels and for periods at the discretion of the U.S. to measure daily catch rates; estimate species, size, and age compositions; collect other biological data as appropriate; determine location and duration of hauls; and observe gear dimensions and performance.

(5) *Research.* Bona fide fishery or fishery-related research (but not exploratory fishing) by foreign governments will be encouraged. Valid results of such research will be considered by the United States management entity in determining total allowable catches and other management measures. Cooperative U.S.-foreign research ventures will be planned and executed when they are found to be in the best regional interest of the U.S.

6.0 RELATION TO NATIONAL STANDARDS

The prescriptive measures contained in this preliminary fisheries management plan (total allowable catches, allocations to foreign fishermen, and regulations pertaining to foreign fishermen) have been designed to be consistent with the seven national standards listed in Pub. L. 94-265.

Total allowable catches are entirely for the purpose of preventing overfishing (*standard #1*), are based upon the best scientific evidence available (*standard #2*) and applied to the extent possible to individual stocks or stock complexes throughout their range (*standard #3*).

Inasmuch as this document deals solely with foreign fisheries, that provision of the legislation concerning nondiscrimination among the residents of states (*standard #4*) does not apply.

Those regulations which isolate the foreign trawl fisheries from fisheries for other species (5.A.1.a–c) and from key areas where incidental catches of species especially important to the United States (5.A.1.d–e) will promote efficiency in resource utilization (*standard #5*) by

Footnotes at end of document.

reducing potentials for gear conflict, incidental catch of nontarget species, and exploitation of juvenile fish which have not reached the size where cohort production is maximized. Further, the provision (5.A.1.f) which calls for termination of a nation's fishing operations in the region when the quota for any species is achieved will undoubtedly promote efficiency in resource utilization by providing a tremendous incentive for developing species-specific gear and fishing strategy.

Monthly catch reports (5.B.2), check-in/check-out procedures (5.C), and observers monitoring fishery performance (5.D) will permit the timely detection of anomolies in the catch or the fishery (*standard #6*).

Reliance upon easily monitored time-area closures (5.A.1) will minimize that surveillance and enforcement activity required to assure foreign compliance to this plan (*standard #7*).

7.0 References

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8.0 Footnotes

[1] International North Pacific Fisheries Commission.

[2] A complete listing of violations and gear losses is available from the Northwest Fisheries Center, National Marine Fisheries Service, Seattle, Wash.

[3] Using the standard Schaefer production model where maximum yield occurs when the population is at one-half of its virgin abundance.

[4] TAC for the North American fishery is set by the International Pacific Halibut Commission and is not available at the time of writing; it is expected to be no greater than 10,000 metric tons.

[5] Except Canadian, as arranged for in U.S.-Canada deliberations in which the historic nature of Canadian halibut fishing under the aegis of IPHC is taken into account.

[6] To the Regional Director, NMFS, Juneau, Alaska.

9.0 Appendices

Appendix A—Kodiak Gear Areas

(1) *North Latitude:* 57°15′, 56°57′, 56°21′, 56°26′, 57°15′. *West Longitude:* 154°51′, 154°34,′ 155°40′, 155°55′, 154°51′.

(2) *North Latitude:* 56°27′, 55°46′, 55°40′, 55°48′, 55°54′, 56°03′, 56°03′, 56°30′, 56°30′, 56°27′. *West Longitude:* 154°06′, 155°27′, 155°17′, 155°00′, 154°55′, 154°36′, 153°45′, 153°45′, 153°49′, 154°06′.

(3) *North Latitude:* 56°30′, 56°30′, 56°44′, 56°57′, 56°45′, 56°30′. *West Longitude:* 153°49′, 153°00′, 153°00′, 153°15′, 153°45′, 153°49.

(4) *North Latitude:* 57°05′, 56°54′, 56°46′, 56°46′, 57°19′, 57°05′. *West Longitude:* 152°52′, 152°52′, 152°37′, 152°20′, 152°20′, 152°52′.

(5) *North Latitude:* 57°35′, 57°11′, 57°19′, 57°48′, 57°35′. *West Longitude:* 152°03′, 151°14′, 150°57′, 152°00′, 152°03′.

(6) *North Latitude:* 58°00′, 58°00′, 58°12′, 58°19′, 58°00′. *West Longitude:* 152°00′, 150°00′, 150°00′, 151°29′, 152°00′.

Appendix B—Summary

Conditions and Restrictions

Subpart G—Gulf of Alaska Trawl Fishery

Definitions. (a) Unless otherwise defined herein, the terms used in this Subpart will have the meanings ascribed to them; (b) The conditions and restrictions shall apply to all species of fish and invertebrates taken in trawl gear; (c) The regulatory area for taking those species listed in (b) above is the Gulf of Alaska defined to include that portion of the eastern North Pacific Ocean between the eastern end of the Aleutian Island chain (170° W) and Hecate Strait (54°30′ N) over which the United States exercised fisheries jurisdiction.

Catch quota. (a) The 1977 maximum catch quotas for foreign fishermen in the Gulf of Alaska are as follows:

Species	*Catch quota (metric tons)*
Pollock	125,000
Rockfishes (primarily Pacific Ocean perch)	33,000
Flounders	20,500
Sablefish	[1] 4,000
Atka. mackerel	22,500
Cod	2,300
Others (combination)	16,200

[1] Incidental catch only in trawl fishery not to exceed 2 pct. of total trawl catch.

Open season. The open season for foreign fishing in the Gulf of Alaska will be consistent with the time-area closures in section 4.0.

Time-area closures. (a) Trawling by foreign vessels in the area and during the time period described below are as follows:

1. Six "Kodiak Gear Areas", listed below will be closed to foreign fishing August 10–May 31, to prevent conflicts with U.S. crab pots and halibut setlines:

(1) *North Latitude:* 57°15′, 56°57′, 56°21′, 56°26′, 57°15′. *West Longitude:* 154°51′, 154°34′, 155°40′, 155°55′, 154°51′.

(2) *North Latitude:* 56°27′, 55°46′, 55°40′, 55°48′, 55°54′, 56°03′, 56°03′, 56°30′, 56°30′, 56°27′. *West Longitude:* 154°06′, 155°27′, 155°17′, 155°00′, 154°55′, 154°36′, 153°45′, 153°45′, 153°49′, 154°06′.

(3) *North Latitude:* 56°30′, 56°30′, 56°44′, 56°57′, 56°45′, 56°30′. *West Longitude:* 153°49′, 153°00′, 153°00′, 153°15′, 153°45′, 153°49′.

(4) *North Latitude:* 57°05′, 56°54′, 56°46′, 56°46′, 57°19′, 57°05′. *West Longitude:* 152°52′, 152°52′, 152°37′, 152°20′, 152°20′, 152°52′.

(5) *North Latitude:* 57°35', 57°11', 57°19', 57°48', 57°35'. *West Longitude:* 152°03', 151°14', 150°57', 152°00', 152°03'.

(6) *North Latitude:* 58°00', 58°00', 58°12', 58°19', 58°00'. *West Longitude:* 152°00', 150°00', 150°00', 151°29', 152°00'.

2. 58°30' N to 59°30' N, between 147°40' W and 150°20' W; 57°40' N to 58°05' N, between 148°50' W and 150°30' W; 55°30' N to 56°25' N, between 155°45' W and 156°30' W closed to foreign trawling from 5 days prior to 5 days after the opening of U.S. halibut setline fishery.

3. 163°04' W to 166° W closed to foreign fishing year round.

4. 147° W to 157° W closed to foreign trawling from February 16 to May 15.

5. 140° W to 147° W closed to foreign trawling from December 1 to February 15.

6. The entire region shall be closed for the remainder of the calander year to the fishermen of a nation when that nation's annual allocation of any species listed in Section 2.0 is reached.

Gear restrictions. There are no specific gear restrictions in the regulatory area under this Subpart.

Statistical reporting. (a). *Annual.* Each nation whose fishermen operate in the Region shall report by May 30 of the following year—annual catch and effort statistics as follows: Effort in hours trawled, by vessel class, by gear type, by month, by ½° (lat.) ×1° (long.) statistical area; Catch in metric tons, by vessel class, by gear type, by month, by ½° (lat.) × 1° (long.) statistical area, by the following species groupings:

Rock sole, flathead sole, arrowtooth flounder, other flounders, Pacific Ocean perch, other rockfish, Pacific cod, sablefish (blackcod), walleye (Alaska) pollock, Atka mackerel, any other species taken in excess of 1,000 mt, other fishes.

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